GOVERNMENT OF KARNATAKA

ARCHAEOLOGY IN KARNATAKA

(Papers presented at the National Seminar on Archaeology, 1985)

Editor
A. SUNDARA

Assisted by
K. G. Bhatsoori

1990

DIRECTORATE OF ARCHAEOLOGY & MUSEUMS
MYSORE

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CONTENTS

Contents iii

Illustrations vi

Abbreviations xii

Introduction xiii

Inaugural Address xv

Presidential Remarks xviii

PAPERS PRESENTED

1. Palaeolithic Cultures in Karnataka — An Appraisal
R. V. Joshi 1

2. A Note on the Lower and Middle Palaeolithic Industries of Southern Karnataka
B. K. Gururaja Rao 5

3. The Early Palaeolithic Phase in the Middle Krishna Basin
K. Paddayya 8

4. Quaternary Environment and Palaeolithic Cultures of the Ghataprabha Basin, Karnataka
R. S. Pappu 17

5. Environment Aspects of Early and Middle Palaeolithic Cultures in Southern Karnataka
T. V. Shivarudrappa 23

6. Middle and Upper Palaeolithic in Karnataka - Andhra
M. L. K. Murthy 41

7. The Mesolithic Culture of Karnataka, Kerala and Tamil-nadu-An Appraisal
P. Rajendran 48

8. Palaeontology of the Krishna Basin with special reference to Karnataka
G. L. Badam 58

9. Banahalli : A Neolithic Site
C. Krishnamurthy 67

10. A Neolithic Axe From Anmod – A Note *K. G. Bhatsoori* 81

11. Ashmounds in South India t A Review *V. Rami Reddy* 85

12. The Environment and Economy of the Neolithic Cultures of South India : Palaeobotanical Evidence *Vishnu Mittre & Savitri Ravi* 100

13. Prehistoric Animals and Human Culture in Karnataka *K. R. Alur* 113

14. On the Origin of the Malwa Culture of the Maharashtra *S.A. Sali* 118

15. Some Aspects of the Bihar – Karnataka Chalcolithic Complex *Sita Ram Roy* 129

16. Excavation of Ancient Zinc Smelting Furnaces at Zawar, Rajastan *K. T. M. Hegde* 135

17. New light on the Megalithic Excavations at Heggadehalli and Koppa *K. K. Subbayya* 151

18. Megalithic Karnataka – A Locational Analysis *Ravi Moorti* 154

19. Megalithic Culture of Goa *P. P. Shirodkar* 172

20. The Megaliths of Maharashtra and Karnataka *S. B. Deo* 181

21. Vidarbha Megaliths and Andhra-Karnataka - Contacts and Correlation *K. P. Rao* 198

22. The Megalithic Graves of the Srisailam Submersible Area *B. R. Subramanyam & J. Suryanarayana Raju* 201

23. Megaliths of Varanasi – Allahabad and Karnataka Some Aspects *P Singh* 205

24. The Megalith – New Tool for Phenotype Identification of Culture
K. Timmareddy & Krishna Rao 210

25. Some Recent Archaeological Notices : Megalithic Relics in Dakshina Kannada - A Study
B. Vasanta Shetty 215

26. Iron Objects from South Indian Megaliths(Karnataka) - A Technological Study and Significance
O.P. Agrawal, Hari Narain & G.P. Joshi 219

27. Black and Red Ware Phase at Atranjikhera and its Implications for South India
R.C. Gaur 235

28. The Problem of White Painted Black and Red Ware in Tamilnadu – Karnataka
P. Narayan Babu 241

29. Rock Paintings in Mallapur, Gangavathi Taluk, Raichur District
R. M. Shadaksharaiah 245

30. Rock Paintings in Hampi : Some Aspects
A. Sundara 253

31. Rock Paintings of Bhimbetka and Karnataka : Theme, Style and Technique
Y. Mathpal 269

32. The Salient Features of Satavahana Material Culture in Andhra Karnataka Regions
V. Krishna Sastry 277

33. The Early Historical Phase in the History and Archaeology of Karnataka
S. Nagaraju 288

34. Roman Antiquities (including coins) in Karnataka-Maharashtra
C. Margabandhu 296

35. Some Problems in Medieval Archaeology
M.S. Mate 308

36. Graves of the Early Iron using people at Komaranahalli : Recent Evidence
M. S. Nagaraja Rao 311

Bibliography 321
List of Participants 363

LIST OF ILLUSTRATIONS

Maps and Figures related to the articles :

The Early Palaeolithic phase in the Middle Krishna Basin

Fig. I Map of the middle Krishna Basin showing the distribution of Early Palaeolithic sites

Environment Aspects of Early Middle Palaeolithic Cultures in Southern Karnataka

Fig. I Early and Middle Palaeolithic sites in Southern Karnataka
Fig. II Location of sites and landforms
Fig. III Kibbanahalli and surrounded hillocks
Fig. Iv Section-River terraces, layers of sand

Palaeontology of the Krishna Basin with special reference to Karnataka

Fig. I Fossil Sites in the KrishnaValley
Fig. II Litho and Bio-Stratigraphy of the Krishna Valley

A Neolithic Axe from Anmod—A Note

Fig. I Neolithic Axe-Anmod, Joida Taluk, Uttara Kannada District, Karnataka

Ashmounds in South India

Fig. I Map of South Western Andhra Pradesh showing the distribution of Pre and Proto-historic sites
Fig. II Palavoy and its surroundings
Fig. III Map of South India showing the distribution of Ashmounds in relation to Neolithic and Megalithic Sites

On the Origin of Malwa Culture ofthe Maharashtra

Fig. I Notched and tanged arrow heads of stone
Fig. II Khatoli, District Mahindragarh, Hariyana : Black on Red Ware, layer 5

Excavation of Ancient Zinc Smelting Furnaces at Zawar, Rajastan

Fig. I Zinc Deposits in India
Fig. II A Cross section of the Zinc Distillation Furnace found at Zawar

Megalithic Karnataka – A Locational Analysis

Fig. I Distribution Pattern of Megalithic Sites in Karnataka

Megalithic Culture of Goa

Fig. I Menhir
Fig. II Trilithons
Fig. III Dolmen
Fig. IV Alignments

Some Recent Archaeological Notices : Megalithic Relics in Dakshina Kannada-A study

Fig. I Side view of animal & rock bruising from Gavali, Kundapur

Iron Objects from South Indian Megaliths (Karnataka) – A Technological Study and Significance

Fig. I Iron objects showing sampling Zones
Fig. II Sketch of a section of Spear
Fig. III Sketch of a section of rod with hook
Fig. IV Sketch of a section of Bar
Fig. V Sketch of a section of Spear from Zone
Fig. VI Sketch of a section of Spear revealed layer structure
Fig. VII Sketch of a section of Sword

Black and Red Ware Phase at Atranjikhera and its Implications for South India

Fig I Ahar-Black & Red Ware (Painting Omitted)
Fig. II Atranjikhera-period II Black & Red ware phase

Rock Paintings in Mallapur, Gangavati Taluk, Raichur District, Karnataka

Fig. I A group of overlapping figures, Mallapur
Fig. II Biggest male figure, Mallapur
Fig. III Seated figure, Mallapur
Fig. Iv Standing couple figure

Rock Paintings in Hampi : Some Aspects

Fig. I Paintings in a cave near 'Sugriva Guha' (human, crocodile etc.)
Fig. II Paintings on a boulder in Mosalaihana Gudda
Fig. III Paintings near Hemakuta Temple group
Fig. IV Paintings near the junction of the roads, animal group
Fig. V Paintings behind Virupaksha Temple, Kadirampur Road
Fig. VI Paintings near 'Brahmadevara Gundu'

Graves of the Early Iron-using people at Komaranahalli – Recent Evidence

Figs. I-III, Komaranahalli-Conical Lids

Plates related to the articles :
Palaeolithic Cultures in Karnataka - An Appraisal

Pl. I General view of the Acheulian locality at Yediyapur, Baichbal Valley, Gulbarga District.
Pl. II Close up of the occurrence of artifacts at the Acheulian locality I near Yediyapur, Baichbal Valley, Gulbarga District.
Pl. III Close-up of the Acheulian locality IX near Mudnur, Baichbal Valley, Gulbarga Dist. showing the occurrence of animal fossils along with stone artifacts.
Pl. IV General view of the Acheulian locality X near Mudnur, Baichbal Valley, Gulbarga Dist. showing the occurrence of artifacts in brownish clay

The Mesolithic Culture of Karnataka, Kerala and Tamilnadu - An Appraisal

Pl. I Mesolithic artifacts from Malampuzha, Palghat Dist., Kerala
Pl. II Mesolithic artifacts from Altappadi, Palghat Dist.,Kerala.
Pl. III Mesolithic artifacts from Padippara, Palghat Dist., Kerala.
Pl. IV Mesolithic artifacts from Tenmalai, Quilon Dist., Kerala.
Pl. V Mesolithic artifacts from Sawyirpuram, Tinnevelli Dist., Tamilnadu.
Pl. VI Stratigraphical position - Mesolithic site.Uppinangadi, South Kanara, Coastal Karnataka

Banahalli – A Neolithic Site

Pl. I General view of the habitation site, South view, Banahalli, Malur Taluk, Kolar Dist.
Pl. II General view of the site, East view (disturbed), Banahalli,Malur Taluk, Kolar Dist.
Pl. III General view of the cave shelter, Banahalli, Malur Taluk, Kolar Dist.
Pl. IV General view of a terrace on the hill, known as Garnatta or Kudurenatta, Banahalli, Malur Taluk, Kolar Dist. Each individual indicates the entrance of the cave shelter.
Pl. V General view of the excavations, Banahalli, Malur Taluk, Kolar Dist.
Pl. VI General view of the burial, Banahalli, Malur Taluk, Kolar Dist.
Pl. VII Plan of a circular structure with post holes Banahalli, Malur Taluk, Kolar Dist.
Pl. VIII General view of the Megalithic burials, Banahalli, Malur Taluk, Kolar Dist.

A Neolithic site from Anmod – A note

Pl. I Neolithic Axe – Anmod, Joida Taluk, Uttara Kannada District

Ashmounds in South India – A Review

Pl. I Palavoy - Ashmound I, Trench 1, Section facing East

The Environment and Economy of the Neolithic Cultures of South India : Palaeobotanical Evidences

Pl. I Cross section of charcoal piece showing typical aliform paratrachael parenchyma, forming cyelets round the pores and black deposits often filling the Pore cavity either completely or partially X 40. Acasia Sp.

Cross section of charcoal piece showing vessel distribution and Parenchyma pattern X 40

Tangential section of charcoal piece showing homogeneous rays exhibiting ehelon arrangements X 120
Cross section of Charcoal piece showing distribution of vessels plugged with black gom like deposits X 40
Pl. II Carbonised seeds of Dolichos biflorus
Carbonised Seeds of Phaseolus aureus

Carbonised Seeds of Eleusine coracara from Hallur X1o. Polyalthia Sp.

Cross section of Charcoal piece showing typically retialate type of parenchyma forming a net like structure and vends uniformly distributed in radial multiples of 2-3X40.

Cross section of Charcoal piece showing numerous small pores grouped in straight radial limes, and numerous very fine Medullary rays X 40.

On the Origin of Malwa Culture of the Maharashtra

Pl. I Notched and tanged arrowheads of stone; no. 4 from Sihonia, Madhya pradesh, no. 5 from Diamabad and the rest from Patne

Excavation of Ancient Zinc Smelting Furnaces at Zawar, Rajastan

Pl. I Massive heaps of debris formed by past Zinc Smelting Operations at Zawar
Pl. II A series of impressive, nearly intact structural remains of Zinc distillation furnaces brought to light in the excavations at Zawar.
Pl. III Structural details of an Ancient Zinc Distillation Furnace excavated at Zawar. Below the perforated terracotta plate is the Zinc vapour condensation chamber. Above the plate is the furance chamber. Some of the Zinc distillation retorts are seen in situ.
Pl. IV Perforated terracotta plate that separates the condensation chamber from the furance chamber.
Pl. V One of the used Zinc smelting retorts found in the excavation at Zawar.
Pl. VI Zinc Vapour Distillation and Condensation
Pl. VII A freshly cut open used retort at Zawar showing the clear Cylindrical channel through thesintered spent smelting charge for the Zinc vapour to freely flow out of the retort.

The Megaliths of Maharashtra and Karnataka

Pl. I A stone circle with a smaller circle in the centre with spenning to the south, Bhagimohari, Maharashtra

Pl. II A stone circle with double chamber of smallerpebbles in the centre and a passage to south, Bhagimohari, Maharashtra
Pl. III Double burial in a stone circle, Mahurzhari, Maharashtra
Pl. IV Remains of megalithic house-postholes, lime plastered floor and circular storage bins, Bhagimohari, Maharashtra
Pl. V A reconstructed model of an iron-smelting furance, Naikund, Maharashtra.
Pl. VI Different types of chises of iron, Borgaon, Maharashtra
Pl. VII A copper pot with three parts rivetted with iron, Mahurzhari, Maharashtra.
Pl. VIII Horse ornaments of copper sheets, Raipur, Maharashtra.

Some Recent Archaeological Notices: Megalithic Relics in Dakshina Kannada - A Study

Pl. I Megaliths (port-holed cist) from Kakkunje, Udupi Taluk, Dakshina Kannada Dist.
Pl. II Rock Bruising from Gavali - Kundapur Taluk, Dakshina Kannada Dist.

Iron objects from South Indian Megaliths (Karnataka) – A Technological Study and Significance

Pl. I Microstructure of pearlite and relic carbide in metal crystal and mineralized section at 250 x Etchant 2 % Nital
Pl. II Microstructure of pearlite in metal crystal relic carbide along with black slag inclusion in mineralized area at 250x Etchant 2 % Nital
Pl. III Microstructure of pearlite and ferrite in remnant crystal at 630 x Etchant 2 % Nital
Pl. IV Microstructure revealing low carbon area along with high carbon tempered layer inside the section at 250 x Etchant acid mixture
Pl. V Microstructure revealing high carbon tempered layers along with low carbon area and black elongated slab inclusions at 250 x Etchant Acid mixture
Pl. VI Layers of high carbon sheets near the surface as well as inside the section at 250 x Etchant Acid mixture
Pl. VII Microstructure of relic carbide in low carbon area along the high carbon layers at 250 x Etchant Acid mixture

Rock Paintings in Hampi - Some Aspects.

Pl. I Paintings in a cave near 'Sugriva Guha' (human, crocodile etc) close to the river Tungabhadra.
Pl. II Paintings on a boulder in Mosalaihana Gudda (bull, tiger)
Pl. III Paintings near Hemakuta temple group (long fish, short bulky fish)
Pl. IV Paintings near the junction roads, animal group (cattles)
Pl. V Paintings behind Virupaksha temple, Kadirampura road (Human groups)
Pl. VI Paintings near 'Brahmadevara Gundu' (A big panel having human, women, a boy (?), a women with painted body etc.).

Rock paintings in Bhimbetka and Karnataka – Theme, Style and Technique

Pl. I Oxen on rocks - petroglyphs at Maski
Pl. II Peacock with antennae hilt sword–petroglyph from Maski
Pl. III Marked human figures and animals – A painting from Badami

Graves of the Early Iron Using people at Komaranahalli : Recent Evidence

KOMARANAHALLI (Chitradurga dist., Karnataka)
MEGALITHIC EXCAVATION—Grave-1

Pl. I Capstones—After clearing tho vegetation
Pl. II Pottery and Iron Implements
Pl. III Arrowheads.
Pl. IV Dagger or Knife

KOMARANAHALLI, Grave-2

Pl. V Stone Circle
Pl. VI Pottery and Iron Implements
Pl. VII White Painted Black and Red Conical Lids

KOMARANAHALLI, Grave-3

Pl. VIII Capstones
Pl. IX Pottery and Corner Stones

KOMARANAHALLI, Grave-4

Pl. X Skeletal Remains, Pottery and Iron Implements

ABBREVIATIONS

ABORI	Annals of the Bhandarkar Oriental Research Institute, Pune.
AI	Ancient India (Bulletin of the Archaeological Survey of India).
APAS	Andhra Pradesh Archaeological Series, Hyderabad.
ARADH	Annual Report of the Archaeological Department of H. E. H. The Nizams Dominions, Hyderabad.
ARMAD	Annual Report of the Mysore Archaeological Department, Mysore.
ASI	Archaeological Survey of India.
BIAS	Bulletin of Indian Archaeological Society.
BBMPG	Bulletin of Baroda Museum and Picture Gallery.
BDCRI	Bulletin of Deccan College and Research Institute, Pune.
DCPG & RI	Deccan College Post Graduate and Research Institute, Pune.
GSI	Geological Survey of India.
IAR	Indian Archaeology-A Review.
IHQ	Indian Historical Quarterly.
JASB	Journal of the Asiatic Society of Bengal.
JBBRAS	Journal of the Bombay Branch of Royal Asiatic Society.
JGSI	Journal of the Geological Society of India.
JRAI	Journal of the Royal Anthropological Institute of Great Britain and Ireland.
JRAS	Journal of the Royal Asiatic Society, London.
MASI	Memoirs of the Archaeological Survey of India.
MGSI	Memoirs of the Geological Survey of India.
PASB	Proceedings of the Asiatic Society of Bengal.
QJMS	Quarterly Journal of the Mythic Society, Bangalore.
RGSI	Records of the Geological Survey of India.

INTRODUCTION

The Directorate of Archaeology & Museums in Karnataka completed a century of its existence in 1985. Several activities to celebrate its centenary were planned during 1985. One of the programmes was to hold a National Seminar on Archaeology to highlight the contribution of Karnataka to the over all make up of Indian culture through its various Projects and programmes. Therefore, a National Seminar on Archaeology was conducted between 22nd and 24th of December 1985, at Mysore. The themes of the Seminar consisted of archaeological activities such as Explorations, Excavations, Researches in Epigraphy, Numismatics and Art & Architecture.

In this first Volume, we are presenting 36 papers primarily consisting of archaeological researches. The various papers deal with stone-age, neolithic, Iron-age cultures, pre-historic art and early historic settlements including contacts with the Roman World.

In the conduct of the Seminar as well as in the preparation of this publication, the Directorate owes its gratitude to several scholars and colleagues. We would like to record our sincere thanks to Sri M. N. Deshpande, Director General (Retd.), Archaeological Survey of India, who began his career as an Archaeologist in Karnataka, for having inaugurated this National Seminar. Dr. Sundara, Professor & Chairman, Department of Ancient Indian History & Epigraphy, Karnatak University, Dharwad, who was the Director of Archaeology and Museums when the Seminar was held, was kind enough to prepare this first volume for publication assisted by Dr. K. G. Bhatsoori, Epigraphist in the Directorate. To both of them our thanks are due. The Director of Administrative Training Institute, Government of Karnataka, Mysore and his colleagues provided the venue and other facilities for holding the Seminar. We would like to express our gratitude to them.

The staff of the Directorate of Archaeology and Museums particularly Sri C. S. Patil, Registering Officer, Late Sri B. Jayappa, Sri Suryanarayana, Sri H. N. Anantharamu and others assisted Dr. Sundara not only in the conduct of the Seminar but also in the preparation of the manuscript for the Press. I would like to record our appreciation to all of them.

Finally, thanks are due to M/s. Jayalakshmi Printers, Mysore, for printing the Volume in its present form.

(M. S. Nagaraja Rao)
Director of Archaeology
and Museums

MYSORE
Dt. 9-3-1990

INAUGURAL ADDRESS

Dr. Nagaraja Rao, Dr. Sundara and distinguished scholars,

It gives me very great pleasure in inaugurating this National Seminar on Karnataka Archaeology to mark the opening of the Centenary Celebrations of the Department of Archaeology and Museums, Karnataka State. I am aware that this honour has been bestowed on me because of the bindness of present Director of the State Department of Archaeology, Dr. Sundara and his predecessor Dr. Nagaraja Rao (who is now holding the post of the Director General of Archaeology in India) for both of them were initiated by me in the discipline of archaeology when they joined the Archaeological Survey of India as Exploration Assistants during the First Five Year Plan period. I am glad that both of them have distinguished themselves having contributed substantially to the progress of archaeology in the State of Karnataka and in the wider national context. But for this personal attachment and regard, I find that there are many in this distinguished gathering of scholars, who could have been done this task with greater distinction. I, therefore, proceed to discharge this responsibility with a sense of humility and trepidation.

Among the various State Departments of Archaeology, the Karnataka Department of Archaeology & Museum has a very distinguished record. It was established a century ago under the leadership of B. Lewis Rice. His greatest contribution was in the field of Epigraphy. He published as many as 9,000 inscriptions from different districts of Mysore, in a journal called *Epigraphia Carnatica*, the publication of which was also commenced in the year 1886. On this occasion, I also cannot forget the single coutributions made by Col. Colin Mackenzi, R. Narsimhachar, Dr. R. Shama Shastri, Dr. M. H. Krishna, B. Subba Rao, R. V. Joshi and Dr. M. Seshadri to the unravelling the past of Karnataka by their literary, epigraphic and archaeological discoveries, art-architectural studies and field work.

My association with Karnataka goes back to 1945 when I went to Bangalore in the company of Sir R.E M Wheeler, the then Director General of Archaeology and my colleague Shri V.D. Krishnaswami to attend the Indian Science Congress where Sir Mortimer Wheeler delivered his Presidential Address in the Section of Archaeology and Anthropology. It was then that I met, Dr. M.H. Krishna, an eminent teaher and the then Director of Archaeology of Mysore State. Immediately after the conclusion of the Science Congress Session, in early January 1946. we all went to Brahmagiri to see the ancient site of Brahmagiri excavated by Dr. Krishna. As you all know that the ancient sites of Brahmagiri and Chandravalli were subsequently excavated by the Archaeological Survey of India and I was put in charge of the Chandravalli excavations. The excavation of these two sites provided sequence of cultures from the

Neolithic to the historical period and a firm datum for future work in South India. Later, in 1949 I was associated with the Pre-historic survey of Malaprabha river undertaken by the late Dr. F. E. Zeuner, Professor of Environmental Archaeology, London University, along with Dr. H.D. Sankalia and the late Shri V.D. Krishnaswami and Shri Panchmukhi. Later, as Superintendent in Western Circle, Poona and South-western Circle, Aurangabad I held charge of the northern Districts of Karnataka, which include glorious monuments of early and late Chalukyan period and the Bijapur Sultanate. I remember with some nostalgia the work I did in the field of conservation of monuments in this area.

The Karnataka State Department of Archaeology is one of the finest and well-equipped Departments and has to its credit magnificient work in the field of excavation, architectural studies, epigraphy and conservation. The excavation at Hampi undertaken as a National Project jointly by the Archaeological Survey of India and the Directorate of Archaeology, Karnataka, is a very important project and I am sure that in the years to come Vijayanagar will be a star attraction to archaeologists as also to Indian and foreign tourists. When the results of excavations at Fatehpur Sikri & Champaner & Vijayanagara are studied together, we shall be able to write a new chapter on the urbanisation of the medieval period. The Department also proposes to excavate Sannati, a Satavahana site with extensive Buddhist remains. However, we cannot forget the work done by Dr. Nagaraja Rao at Tekkalakota and Hallur and the work done on megalithic monuments by Narasimhaiah and Dr. Sundara. The excavations undertaken at Vadgaon Madhavpur near Belgaum by the Karnataka University has also contributed a good deal in enriching our knowledge about the historical past of Karnataka.

Looking at the long list of papers which are going to be presented at the Seminar, I find that they cover very important problems from pre-history to almost the modern period. Next few days will be extremely enjoyable to all the scholars assembled here. Considering the time at our disposal I find that the seminar papers will have to be read simultaneously in different sections and scholars will find it difficult to be present at different places to hear and discuss subjects in which they are interested.

Hundred years is a fairly long period to take stock of the work done in a particular State, and I am sure you will all agree that Karnataka has emerged as a significant area which holds the key to the solution of many problems of cultural migrations in the sub-continent. I am reminded of a great verse of the poet Saint Jnanesvara, who tried to assess the magnitude of his spiritual progress and illustrated it beautifully in the following verse.

इवले से रोप लावियेले द्वारीं । त्याचा वेलूगेला गगनावेरीं ॥
मोगरा फुलला मोगरा फुलला । फुलें रेचितांची बहरु कलियासी आला ॥

He mentions that a small sapling of the *mogra* creeper was planted at the door-step but now this creeper has grown up and reached the sky. In the same manner the littlesapling in the form of the State Department of

Archaeology, that was planted by the Mysore Government 100 years ago has now grown into a tree reaching to the skies.

To a person from Maharashtra, I feel great attachment with Karnataka. The cultures of these two regions are so intertwined and blended that there has been give and take of ideas and cultural traits from ancient times. The most outstanding illustration of this cross-culturization is Vitthal, the God of Pandharpur, who is worshipped with great devotion by people from Mahrashtra and Karnataka. It is said that God Vitthal had gone to Vijayanagara and for whom a great temple was erected by Vijayanagara king (Devaraya II) on the banks of Tungabhadra but then returned to Pandharpur because of the devotion of Pundalika. Karnataka and Maharashtra together form a bridge between the north and the south and if we have to understand the personality of India we have to concentrate our attention to this area, for, it holds many secrets within its bosom.Let me hope, that in the years and decades to come, archaeology in Karnataka will prosper from strength to strength. It is gratifying to find that many Universities in the region are fully geared to take up archaeological projects and by pooling the resources of the State govt. and the Universities they can achieve greater results in unravelling the past of this great land. With this wish, I have great pleasure in inaugurating the Seminar.

23-12-1985
New Delhi

M. N. Deshpande
Director General (Retd.)
Archaeological Survey of India

PRESIDENTIAL REMARKS

Respected Sri Deshpande, Dr. Sundara and distinguished scholars,

It is indeed a privilege to preside over the inauguration of the National Seminar on Archaeology of Karnataka, being held as part of the Centenary Celebrations of the Directorate. Particularly so, since Sri Deshpande who is our teacher has just inaugurated the Seminar. Sri Deshpande has described the contribution of Karnataka State Department of Archaeology in the past 100 years and his own association with the State for four decades. While we are proud of the contribution of the State Directorate of Archaeology and Museums for more than 100 years, this in my view is the opportune time to reflect about lacunae in various aspects of Archaeology not only in the State but in the Country as well. One of the major responsibilities of the Departments of Archaeology is the preservation of our Heritage. When we look at the present position we find that not only these Directorates cannot discharge their responsibilities primarily for want of sufficient financial allocations, but also for lack of trained personnel to carry out these tasks. There is also another dimension to this problem. That is, developmental projects and industralisation have caused great pressure on land use. The growth and movement of population are also causing the greatest hazard viz., encroachment of land around the monuments. Ignorance of the people and wanton vandalism are other causes for the unhappy status of our heritage. In the areas of Field Archaeology, Epigraphy and Numismatics, trained expertise is dwindling. The facilities to train such personnel are also totally inadequate, considering the vastness of our Nation. It is, therefore, an absolute necessity to reflect on these problems and try to find solutions. Celebrations of the centenary of the Karnataka State Archaeology Department is therefore a fit occasion to think of these problems. In this context, I would like to suggest that as a part of the Centenary Celebrations, the authorities of the Directorate of Archaeology and Museums in Karnataka may consider holding a special Seminar with the theme "Training of Personnel and Conservation of Heritage." I hope this suggestion will find favour with them.

In the ensuing Seminar, we will review the progress achieved in the field of Archaeology and allied disciplines in Karnataka in particular and India in general. I hope that this Seminar will generate lively discussions and produce good academic results. I am grateful to Dr. Sundara and Government of Karnataka for having given me this opportunity to preside over the inauguration of the National Seminar of Karnataka Archaeology as part of the Centenary celebrations. In offering my respectful regards to Sri Deshpande, I wish success in the conduct of this Seminar.

23-12-1985
New Delhi

M. S. Nagaraja Rao
Director General
Archaeological Survey of India

1. PALAEOLITHIC CULTURES IN KARNATAKA - AN APPRAISAL

R. V. Joshi

A couple of years back (1983) in a Seminar on "Recent Advances in Indian Archaeology" held at the Deccan College, Pune, under the item "Cultural Ecology of Early Man in India", in the Key Paper and the subsequent discussions on it, we have attempted assessment of all aspects of prehistoric cultures of India (Deo and Paddayya, 1984). In that discussion we had taken into account all the three stages of Indian Stone Age. Within a short time now we are again trying to examine the progress and results of palaeolithic cultural studies in Karnataka region. Such types of regional assessments are very essential for discussing the details of peculiarities of cultures of that particular region. The Seminar on "Archaeology of Karnataka" held at Mysore in January 1973 was the step in this direction (Narasimha Murthy, 1978).

In Karnataka palaeolithic research has completed more than 100 years. Although initially the investigations were confined mainly to the location of various Stone Age sites and collection of artefacts for museum purposes, since 1950 or so, we have paid attention to the contextual aspects (e.g. stratigraphy-river terraces etc. and chronology) for understanding the man-and-land relationship and if possible the life-ways of the prehistoric communities of Karnataka.

To achieve these objectives the efforts were being made (and some are in progress) mainly in the three areas of Karnataka: (i)Hunsgi valley (Paddayya, 1982), (ii)Ghataprabha valley (Pappu 1974), (iii) Shorapur-doab (Middle Krishna basin) (Korisettar, 1979). The problems that are being tackled in the first two areas are likely to be discussed in this Seminar by the respective scholars, who are engaged in this work. The third one with particular reference to the high-level gravels of the Krishna river and their archaeological significance has been studied by Dr. Korisettar (1979).

Environment

Karnataka forms the south-western portion of the Indian peninsula. Physiographically it has three distinct units — the coastal area bordering the Arabian sea, the central mountainous region and the eastern plateau. As far as prehistoric cultures are concerned the eastern plateau region is more significant. Crossed by the Krishna river and its several tributaries the plateau region shows a rolling topography. These streams traverse the varied geological formations — Archaeans, Cuddapahs (Kaladgis) and Deccan Traps which have greatly influenced their valley forms (Joshi, 1955). The Karnataka coast which lies between Bombay and Kerala is a humid tropical coast. On the basis of physiographic characteristics it can be distinguished as N. Kanara and S. Kanara types: the former is more essentially a high land than a low land while S. Kanara is like the Ulhas basin and Goa is an embayment of low lands, nearly 75-80 km. wide in the Netravati valley behind Mangalore (Spate, 1954).

Climatically the Karnataka has the monsoonic character and excepting the Western Ghats and coastal tract, the entire region can be classed as semi-arid. This basic semi-arid character with occasional monsoonic variations had not changed during Quaternary. The changes were rather on micro-level and sometimes got little aggravated by the tectonic activities causing base-level changes in the fluvial system of the region resulting rejuvenation or piling of sediments in the river valleys. At the close of Quaternary i.e., early Holocene the climatic changes were more emphatic (Rajaguru and Kale, 1985, pp. 16-27).

The geological foundation of the area is complex and the rock types that are available in different parts of this state seem to have greatly influenced the locations of sites of different palaeolithic cultures. This is much more emphatic in the southern Mysore region and part of the Dharwar area which are composed of metamorphic rocks where, excepting the quartzite types, other rocks are unsuitable for the manufacture of palaeolithic tools. The most common cultures of these areas are mesolithic cultures in which quartz is available in the form of veins in the metamorphic rocks which has been utilized for making microliths.

Palaeolithic Cultures

i) The Lower Palaeolithic assemblage of this region, as in the case of other regions of India, has the standardized (handaxe-cleaver-chopper complex) forms irrespective of the type of raw material (quartzites, limestone, Deccan Trap, dolerite, chert and rarely even granite) used in their manufacture. There is of course difference in the percentage of each component of this culture at different sites. However how far this difference reflects the relative antiquity or separate cultural identity (chopper group-handaxe group) or influence of locally available raw material or a mark of a distinct cultural stage (early or advanced) requires investigation at each of these localities.

Typologically the Lower Palaeolithic cultures by and large display late or advanced Acheulian forms. This is particularly the case in the Kaladgi (quartzitic) area of N. Karnataka (Malaprabha-Ghataprabha basins). In the Hunsgi valley wherein the tools are mostly made of limestone, typologically the Lower Palaeolithic cultures show Early Acheulian characters, although late Acheulian types are not totally absent. On the basis of chemical tests (fluorine determination) on the animal fossils found in the valley the Hunsgi Acheulian appears to be older than the Acheulian culture occurring in other parts of Karnataka. There is however no clear stratigraphic evidence to distinguish the sub-phases of the Acheulian culture. In fact, to some extent, this is the situation everywhere in India.

ii) The Middle Palaeolithic industries are made of chert and allied minerals and are comparable to those from adjoining Maharashtra and possess the same features of non-standardized forms : varieties of scrapers and points, worked flakes and so on. Small cordates and ovates occur in these collections. But these features are not enough to distinguish this phase as Mousterian of Acheulian tradition as has been stratigraphically confirmed in Central Indian rock shelters (Bhimbetka) (Misra, 1978). It is needless to stress again that majority of Middle Palaeolithic cultures from different parts of India are comparable to those from Africa, which for long time were designated as Middle Stone Age cultures.

No fossils have been found in Karnataka together with tools of this culture showing new forms, other than those types found in Hunsgi valley and at Nittur with the Lower Palaeolithic cultures. Thus there is no definite evidence of the change of environment to explain the change in cultural outfit.

iii) The Upper Palaeolithic culture has been noticed at a few sites in Karnataka. It consists chiefly of blades, a few points and traces of burin forms. The collections from Salvadgi area are very interesting.

Chronology

As far as the chronology of the palaeolithic cultures is concerned the picture is yet unclear. The earlier attempts on this aspect were based primarily on the stratigraphy (river sections, terraces) and sedimentological studies of the tool [illegible] deposits were not very satisfactory. We are however trying in other parts of India the application of chemical and petrological methods on the sediments (e.g. felspar and their weathering characteristics, percentage of various iron and aluminium oxides, etc.) and the same may be eventually useful in Karnataka if no other evidence becomes available in future.

Only two or three localities in Karnataka have yielded animal fossils (e.g. Hunsgi valley, Nittur, and near Gokak, etc.). To some extent these fossil finds are useful in establishing approximate late Pleistocene or may be some cultures to late Middle Pleistocene age of the associated palaeolithic cultures.

No pollen studies have been done in Karnataka. Recently Dr. George Rapp has stressed the need of phytolith analysis in addition to pollen studies for understanding palaeoenvironments, particularly the climate and vegetation. This kind of investigation may be eventually useful for solving the chronologial problems also.

We do not yet have any absolute dates (radiometric or others) for palaeolithic cultures of Karnataka. The radiometric dates reported from coastal Karnataka may be useful for determining Quaternary eustatic events. But they are of little use for fixing the antiquity of the palaeolithic cultures as none of them are so far found in coastal Karnataka.

We have made another attempt for examining whether the fossils found with the palaeoliths in Hunsgi valley are of Pleistocene period and if so of what stage (early or late Pleistocene) For this experiment we chemically analysed these fossils for their various chemical elements (especially flourne and phosphate) (Kshirsagar, 1983). In these studies the values of ratio $100F/P_2O_5$ of the fossils from Hunsgi valley are as follows :

1.	[illegible] Bazurg ..	8.387
2.	Kaldevanhalli ...	6.723
3.	Kupi ...	7.513

According to our work carried out on the fossils of Quaternary period from different parts of India, these fossils belong to late Mid-Pleistocene Stage (Joshi, 1985). For comparison are given below a few results from other areas.

1. Narmada Valley —
    Upper Palaeolithic ... 5.332
    Middle Palaeolithic ... 5.850
    Lower Palaeolithic ... 8.080
2. Godavari Valley —
    6.00 Lower Palaeolithic
3. Kurnool Caves —
    3.67 Upper Palaeolithic

Palaeontologically the Hunsgi fossils have been placed under early Upper Pleistocene Stage.

Some other experiments are in progress by Dr. V.D. Gogate using the calcium-carbonate material the results of which are yet awaited.

Another chemical experiment to determine the intensity of palaeolithic habitation in the Hunsgi valley by phosphate test of the sediments was not successful as the value of the phosphate was very low. This is perhaps due to fluvial erosion of the tool-bearing deposit (Joshi and Deotare, 1983).

Site Occurrences/Settlement pattern

As we have noticed elsewhere in India the majority of palaeolithic artefacts have been obtained in Karnataka from fluvial deposits. (Krishna basin — Malaprabha, Ghataprabha, Tungabhadra valleys etc). A few are located on the plateau surfaces and hill slopes and only a small number (mostly microliths) in the rock shelters (Badami area). Microliths have also been found in Karwar (coast) area.

Dr. Paddayya has studied the clusters of Acheulian sites in the Hunsgi valley. Some of these are centred around the Hunsgi village while others are widely dispersed in the valley. On this evidence he has hypothesised that these two group of sites represent phases in the annual activity cycle of the Acheulian groups. His study has revealed that the palaeoenvironment was basically the same as at present.

In the open-air riverine sites there is a chance of severe disturbance of cultural material and realignment of the clusters as also the abrasion of stone tools. These aspects have been taken into consideration and the excavations had been carried out at the least disturbed localities. To substantiate his hypothesis of Acheulian activity cycle Dr. Paddayya has used the behaviorial data of the present tribal groups of the area. Still it is a question as to how far these inferences of life ways are to be drawn for Lower Palaeolithic population particularly where the palaeolithic implements and a few animal fossil specimens are the only available evidences.

There are several palaeolithic sites in the Kaladgi basin. The Lower Palaeolithic sites occur mostly in the lower half of the Ghataprabha and the Malaprabha valleys which are the major tributaries in the Krishna basin. The tools are found almost on the surface but most of them are fresh and little rolled. Even in the Khyad and Mensgi area of the Malaprabha river where the tools were obtained from the stream bed they were fresh and unrolled. These characteristics show their derivation from the adjoining primary sites.

Several sites occur on the slope surfaces and these clusters are also the primary locations. Dr. Pappu's present work in the Kaladgi basin envisages the study of Quaternary landscape and identification of different types of palaeolithic occurrences in the area. This work is likely to throw light on the settlement pattern of the palaeolithic cultures of this region.

In the middle Krishna basin several Middle Palaeolithic sites are located on high level gravel and looking to the freshness of the tools all seem to be the clusters at primary sites situated on the old gravels. These high level gravels have been formed mostly prior to the Quaternary geomorphic activities in the area. As such the gravel beds have no chronological significance. In fact the limited excavations carried out on the high level gravels have yielded very few tools as most of them occur on the surface.

2. A NOTE ON THE LOWER AND MIDDLE PALAEOLITHIC INDUSTRIES OF SOUTHERN KARNATAKA

B. K Gururaja Rao

Southern Karnataka or the old princely state of Mysore remained more or less on unknown entity from the point of view of the palaeolithic industries. Not that on work has been done in this region so far ; Robert Bruce Foote (1901, pp. 1-131) the pioneer prehistorian, rightly called the Father of Indian prehistory brought to light about seven palaeolithic sites before 1900. He collected tools from the surface without much evidence regarding their stratigraphic context and classified his collections on typological and lithological considerations. No doub he has also tried, in certain cases, to a little extent to record the environmental horizons from which the tools came, but such information is too scanty to place them in their proper chronological and industrial context. In the twenties of the present century Sampat Iyengar (1924) and Rama Rao (1939, p. 65) found a rich site around Kibbanahalli in Tumkur district. This site has been revisited and studied by Seshadri (1955, pp. 271-287) in 1955-56. But in this case also, though the preliminary discovery was made by the geologists, very little information was made available on the environmental setting of the industry. Sreepada Rao (1930, pp. 1-18, 1932, pp. 1-12) another geologist reported the occurrence of the palaeolithic tools from Ranganathapura near Mysore on the Kaveri. Here also we know next to nothing about the stratigraphical position of industry or the environmental setting.

From all the above sites, collections of the tools are also minimal and evidently are not representative in character. Further these collections are also not readily accessible for study. Under the circumstances, till recently it could only be said that the palaeolithic man did live in southern Karnataka and he had some vague similarities with his counterparts in other parts of the peninsular India, but we did not possess any information regarding his environmental surroundings, his co-denizens in the form of flora and fauna or his position in relation to time factor, with his fellow-men from the neighbouring regions.

Seshadri's study of one of the above sites in 1955 first reported by Sampat Iyengar and Rama Rao in 1924 provided much welcome light on the typo-technological and evolutionary stage of the Kibbanahalli palaeolithic industry. He has described the types of tools in some detail. But he himself confesses that his collection comes from the loose gravel spreads and not *in situ* ; hence nothing can be said about the contemporaneity of different types of tools.

During the last decade, some stray attempts were made They provide some, if hazy picture of the environmental setting for the palaeolithic man in southern Karnataka. S. Nagaraju, T.V. Shivarudrappa and K. B. Sadanand[1] all of Manasagangotri, Mysore belonging to different but connected dsciplines of study, explored a small stretch of the upper Kaveri valley around Ranganathittu and Shivasamudra (Bluff) and are reported to have discovered a good number of lower and middle palaeolithic tools. But they are not accessible to the present writer. T.V. Shivarudrappa (1983, pp. 51-56) along with a team of Japanese scholars discovered a scraper from Naravi in Belthangadi taluk of South Kanara district. This is of the middle palaeolithic age made on felsite material. This tool comes from the west coast of Karnataka a densely forest covered tract from where so far no remains of the stone age man has been reported. Since the tool has been found from an identifiable horizon, it can be accepted to come from a geological setting.

During this year (1985) Shivarudrappa and the present author have undertaken two projects aided by the University to study the Geo—Archaeological conditions of the Talkad (1983, pp. 1–10) and Kibbanahalli (1985, pp. 1–12) areas. In the course of our investigations in these two regions we have been able to locate the following new palaeolithic localities.

1. At Talkad in the middle of the river bed on a ridge we found a gravel spread in which we picked up some flake implements assignable to the middle palaeolithic age. The tools are mostly made on quartzite flakes and include points scrapers awls and flake hand axes. We have also been able to notice a fine gravel bed with section of the river which yielded many flakes, but no definite tools could be collected. We have also taken samples of sand from fourteen layers from the sand dunes on the river front which are under analysis. These samples may give us information about not only the chronology but also the ecological setting for the industries.

2. In the Kibbanahalli region from where Seshadri made a large collection, we have also collected some tools but we have been able to identify some gravel sections exposed in the rain gullies on the slopes of the Banasandra–Bertahalli hill range. Two gravel beds separated by alluvial silt deposits with calcareous bands are noticed from which tools in their stratigraphical contexts have been picked up. Thus a stratigraphical context can be provided to the lower palaeolithic and middle palaeolithic industries from this region for the first time. Our intensive investigations here have given us some insight into the drainage pattern the possibility of not one but two perennial lakes which could have provided water to the man and animals. About the geo-environmental factors from this area, my colleague Shivarudrappa has already given a provisional picture.[2] The tools and the other data from this area is under study and a clearer picture may be available after some time.

3. We have also been able to identify certain new localities in the area like Guladahalli, Biligerepalya and Bettahalli which appear to form part of the same complex.

4. Recently we have been able, casually, to pick up three tools of the middle palaeolithic period from the city of Mysore itself. We can definitely say that they are not stray finds which might have travelled from elsewhere for the following reasons. (a) One of the tools was found about one foot B. S. when the ground was being dug for laying a cricket pitch. The entire area, an elevated ground, is studded with fine gravel pieces and lateritic soil – a result of the disintegrated lateritic profile. There are a number of deep rain gullies in which the eroded sections are seem to contain patches of finer gravels. (b) The second implement was picked from one such disturbed pit in the same locality. (c) The third implement was picked up in the dug up earth of the foundation trench of a house in the new housing colony in Kuvempunagar area where also a similar horizon, shown with gravel and lateritic soil profile, exists. Thus though the three tools from Mysore City area are picked up as stray pieces, they do not appear to have come from elsewhere and belong to the localities from where they are picked. Their association with weathered kankar horizons exposed in rain gullies are significant.

The evidence from these above sites are still too scanty and is at a preliminary stage of study to arrive at any firm conclusions. But as far the lower palaeolithic industry a typological comparison of the tools from Kibbanahalli-Biligere zone with those from better studied localities of North Karnataka, Southwestern Andhra Pradesh and North Tamilnadu brings out their close similarities; their provisional stratigraphical context in Kibbanahalli—Biligere horizon closely agrees with similar evidence from other parts of peninsular India.

The evidence from Talkad region and Mysore city of the middle palaeolithic industry also closely resembles similar contexts in south India for that industry.

Notes

1. Personal Communication from Sri T. V. Shivarudrappa, Reader in Geology, Manasagangotri, University of Mysore, Mysore-6
2. Refer to his paper Environmental aspects of the Early and Middle Palaeolithic cultures in Southern Karnataka, published elsewhere in this volume.

3. THE EARLY PALAEOLITHIC PHASE IN THE MIDDLE KRISHNA BASIN

K. Paddayya

The Krishna is one of the major rivers which cut across Peninsular India in a west to east direction. It takes its birth at an altitude of over 1330 metres above sea level on the eastern face of the Sahyadris in Maharashtra. It cuts through the provinces of Maharashtra, Karnataka and Andhra Pradesh, and joins the Bay of Bengal near Vijayawada. The Malaprabha, the Ghataprabha, the Tungabhadra and the Bhima are its major tributaries. Overlooking small stretches in the extreme upper and lower reaches, the entire basin of the Krishna served as a favourable habitat for prehistoric groups. It has made known rich clusters of sites representing every known phase of the Stone Age past.

The long course of the Krishna, covering over 1200 km., could be divided into three broad zones : the upper, middle and lower reaches. The upper tract covers the area between the point of origin in the Sahyadris and the Jaldurg Falls in Gulbarga district. The Deccan Trap and sedimentary rocks of the Kaladgi series (shales, limestones and quartzites) are the main rock formations occurring here (Foote 1876, pp. 1–268). This zone, more particularly the Malaprabha and Ghataprabha valleys, has made known rich evidence pertaining to the Lower, Middle and Upper Palaeolithic and Mesolithic phases (Foote 1876: 241–2; 1916: 130-3 Sankalia, Subba Rao and Joshi 1950; Banerjee 1957; Joshi 1955; Pappu 1974; see also IAR volumes for 1955 to 1963). The lower stretch of the basin entirely falls within the limits of the province of Andhra Pradesh and covers the area between the Krishna–Tungabhadra confluence and the Bay of Bengal. In the upper portion of this stretch the Krishna cuts through deep gorges (the most famous being the Srisailam gorge) characterized by high hanging cliffs made up of sedimentary rocks of the Kurnool series (quartzites and shales). This stretch of the basin has also produced a large number of Stone Age sites, the most famous of these being the Nagarjunakonda complex (Soundara Rajan 1958; pp. 49-113 Subrahmanyam *et al* 1975: 19-71; Isaac 1960; Rao 1966).

The middle or central part of the basin, with which the present paper is concerned, covers the tract formed between the Krishna-Tungabhadra confluence and the Jaldurg Falls. It is in this stretch of its course that the Krishna is joined by its two major tributaries, the Tungabhadra and the Bhima. The area thus covered includes the districts of Gulbarga, Raichur and Bellary, and the western portions of the districts of Mahbubnagar and Kurnool forming part of Andhra Pradesh. It constitutes a classic example of semi-arid climate in Peninsular India and frequently experiences drought conditions. However that be, those familiar with South Indian archaeology will recall the key position this area occupies in protohistoric and early historic studies. This is especially true with regard to the South Indian Neolithic culture. The area has not only the largest known concentration of Neolithic sites but has given us the earliest known sites like Utnur, Piklihal and Kodekal, so much so that most of the archaeologists have come to regard this zone as the nuclear area of the South Indian Neolithic complex. In the present paper it is proposed to emphasize that the area holds a place of pride even in respect of Stone Age studies. It contains rich clusters of sites ranging in age from the Lower Palaeolithic to the Mesolithic, and some of these have been investigated in the light of latest trends in prehistoric research. Furthermore, the area has immense scope for further investigations.

As governed by its semi-arid climate with an annual rainfall of 40 to 60 cm., the area is covered with scrub jungle type of vegetation. From the point of view of terrain morphology, the area consists of trackts of black cotton soil studded with numerous small and big runs and chains of hills rising to a height of 100 to 150 m. above the ground level. The Shorapur-Shahpur group of hills in Gulbarga district, the Deodrug, Maski and Lingsugur groups of hills in Raichur district, and the Sandur and Copper Mountain ranges in Bellary district are some of the well-known chains. The area is mostly occupied by the Archaean series of rock formations comprising Dharwar schists and granite-gneiss (Foote 1895; pp. 1-218 ; Mukherjee *et al* 1934; pp. 1-75; 1937; pp. 1-82). Of the later formations, mention should be made of the Bhima series of rocks (limestones, shales, etc.) which are exposed as a narrow band cutting across Gulbarga district in a south-west to northeast direction (Mahadevan 1941; pp. 102-161 ; Mukherjee 1941; pp. 9-54). The northern part of this district is covered with the Deccan Trap (Mahadevan 1947; pp. 1-60), Shales, quartzites and other sedimentary rocks belonging to the kurnool group, occur in the eastern portion of the area.

On account of the occurrence of these diverse rock formations, the area has rich supplies of raw materials required by the Stone Age populations. Schists, haematite quartzite, chert and jasper occur in the Dharwar series of rocks. Dolerite occurs commonly as dykes in the granitoid formations. Chert veins are common in the Bhima limestones. Limestone itself served as a raw material for some of the Lower Palaeolithic groups. The old District Gazetteers of Bellary and Bijapur record that some 70 to 80 years ago the area was rich in wild life (as quoted by Narendra Prasad *et al* 1978). Just as the ethno-archaeological studies in Hunsgi valley have made known the availability even till today of a variety of wild plant foods (fruits and berries, seeds, leafy greens, tubers, etc.). Of the other factors that rendered the area into a favourable habitat for both the Palaeolithic and the Neolithic groups, mention should be made of the perennial supply of water in the form of small and big rivers, and the formation of suitable basins and valleys amidst hills and tablelands.

Coming to the investigation of Stone Age sites in the area, Bruce Foote must be given the credit for the earliest discoveries. In the course of his geological survey during the years 1884-90 he recorded as many as 77 localities in Bellary district and therefore called it 'the richest in prehistoric remains' among the areas surveyed by him in Peninsular India (Foote 1916; 77-96). As we shall examine later on, his list includes several Palaeolithic sites. The next important development was Subba Rao's (1948; 1949 a and b) detailed investigations in the same district; these culminated in the excavation at Sanganakallu which led to the identification of a Mesolithic assemblage below the Neolithic levels. Reexcavation made later by Sankalia (1969) at this site led him to suspect the existence of even Middle and Upper Palaeolithic levels. The writer's own work in the Shorapur (Krishna-Bhima) doab during the last two decades has made known considerable data concerning Middle and Upper Palaeolithic and Mesolithic phases (Seshadri 1962; pp. 1-5; Paddayya 1970; pp. 165-10; 1974a pp. 1-19, and b pp. 590-609.) For six or seven years he has made a detailed study of the Acheulian culture of the Hunsgi valley (Paddayya 1982). Nagaraju's (1971 ; pp. 218-23) survey of the Amarja basin in the northern part of Gulbarga district covered with the Deccan Trap has led to the discovery of some Middle Palaeolithic and Mesolithic sites. Likewise Korisettar's (1979) work in Raichur district has made known a series of Middle

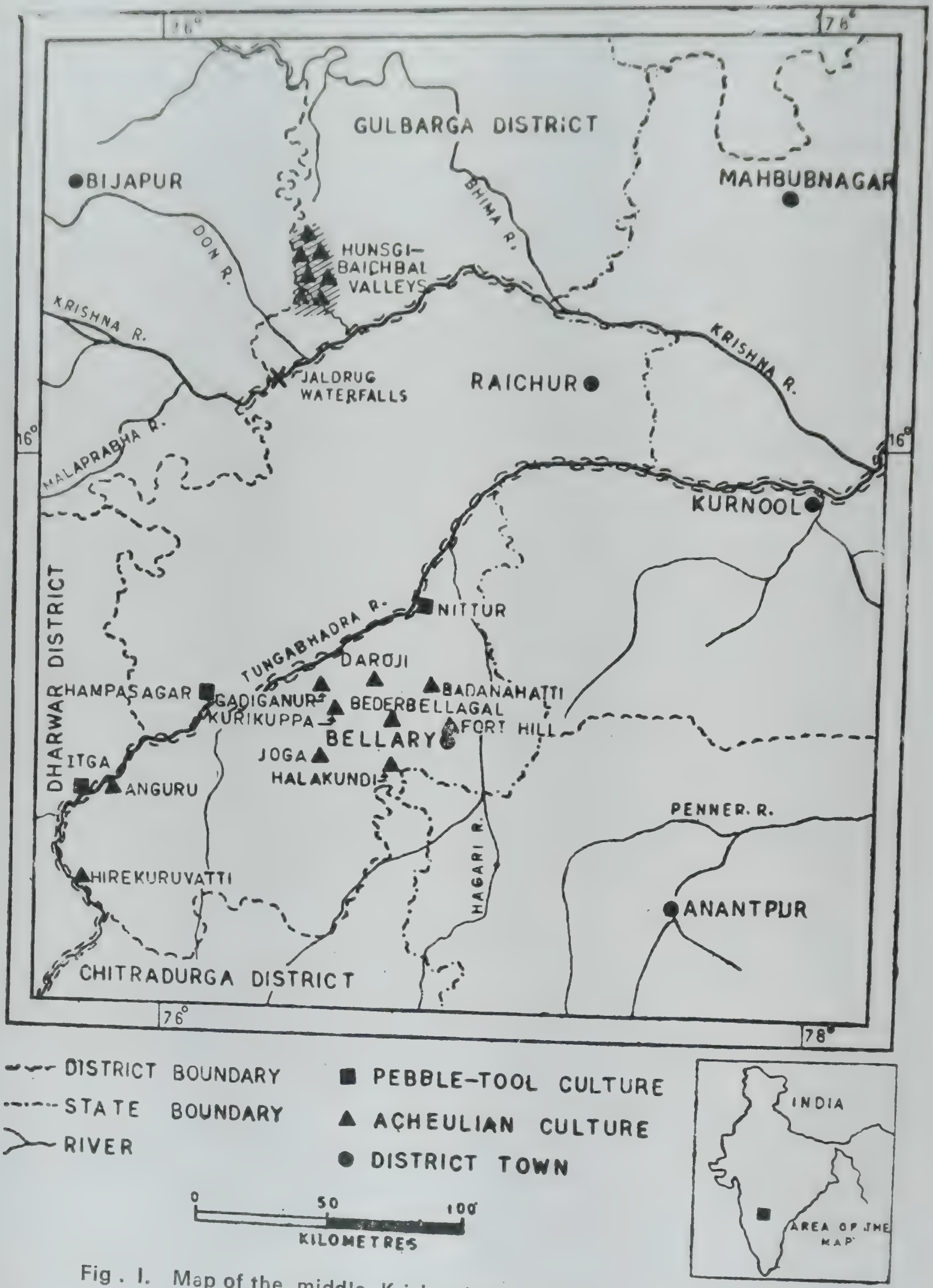


Fig. I. Map of the middle Krishna basin showing the distribution of Early Palaeolithic sites

Palaeolithic sites in association with high-level and bed-level gravels of the river Krishna.

Confining our attention now to the Lower Palaeolithic phase, which forms the main theme of the present paper, stray sites have been reported from the upper reaches of the Tungabhadra covering the districts of Dharwad and Shimoga (*IAR* 1959-60 to 1963-64) and also from the easternmost sector covering the districts of Kurnool and Mahbubnagar (Isaac 1960 : Pappu and Rao 1983). So far no sites have been reported from the Raichur doab. In the present writer's opinion this is almost certainly due to the lack of systematic work in the area. The district has a plentiful supply of dolerite as well as schist and haematite quartzite which were exploited by the Stone Age groups of the neighbouring Bellary area. So it is to be hoped that future work will reveal Lower Palaeolithic sites even from this area. We are thus left with two groups of Early Palaeolithic sites in the middle Krishna basin, viz., the Bellary district and the Hunsgi valley of Gulbarga district Fig. 1 Both these areas have preserved good evidence for the Acheulian culture ; the Bellary area has in addition given evidence of a pebble-tool industry. The following pages will summarize the information about the evidence from these two areas.

a) Pebble-tool culture

This culture is represented by the sites of Hampasagar and Itga found by Subba Rao (1949 a : 127-33) and Nittur discovered by Ansari (1970, pp 1-7). All three are secondary sites located on the river Tungabhadra.

Subba Rao's survey of the stretch of the Tungabhadra near Hampasagar led to the identification of gravel patches at four localities. The gravel deposit (1 to 2 m. broad) was found resting against bedrock and was in turn overlain by 3 m. thick red silt. Excepting a solitary chert flake, Subba Rao could not find any *in situ* artifacts in the gravel deposit. But he did find "a number of pebble tools" (the actual number not specified) in the loose pebble bed of the river. Earlier he found similar artifacts at another place called Itga, lying some 40 km. further upstream of Hampasagar.

The artifacts from Hampasagar are made of quartz and haematite quartzite which were obtained as round, ovalish or elongated pebbles from the bed of the river (Subba Rao 1949b : Pl. 24). The working edge, generally formed on the longer axis of the pebble, was obtained by means of bold flaking. The assemblage includes both uni- and bifacially worked choppers. Although Subba Rao does not specifically refer to these, some flake-tools do seem to occur in the collection (e.g., Pl. 24, No. 12). Noteworthy too is the finding of a pebble-butted handaxe.

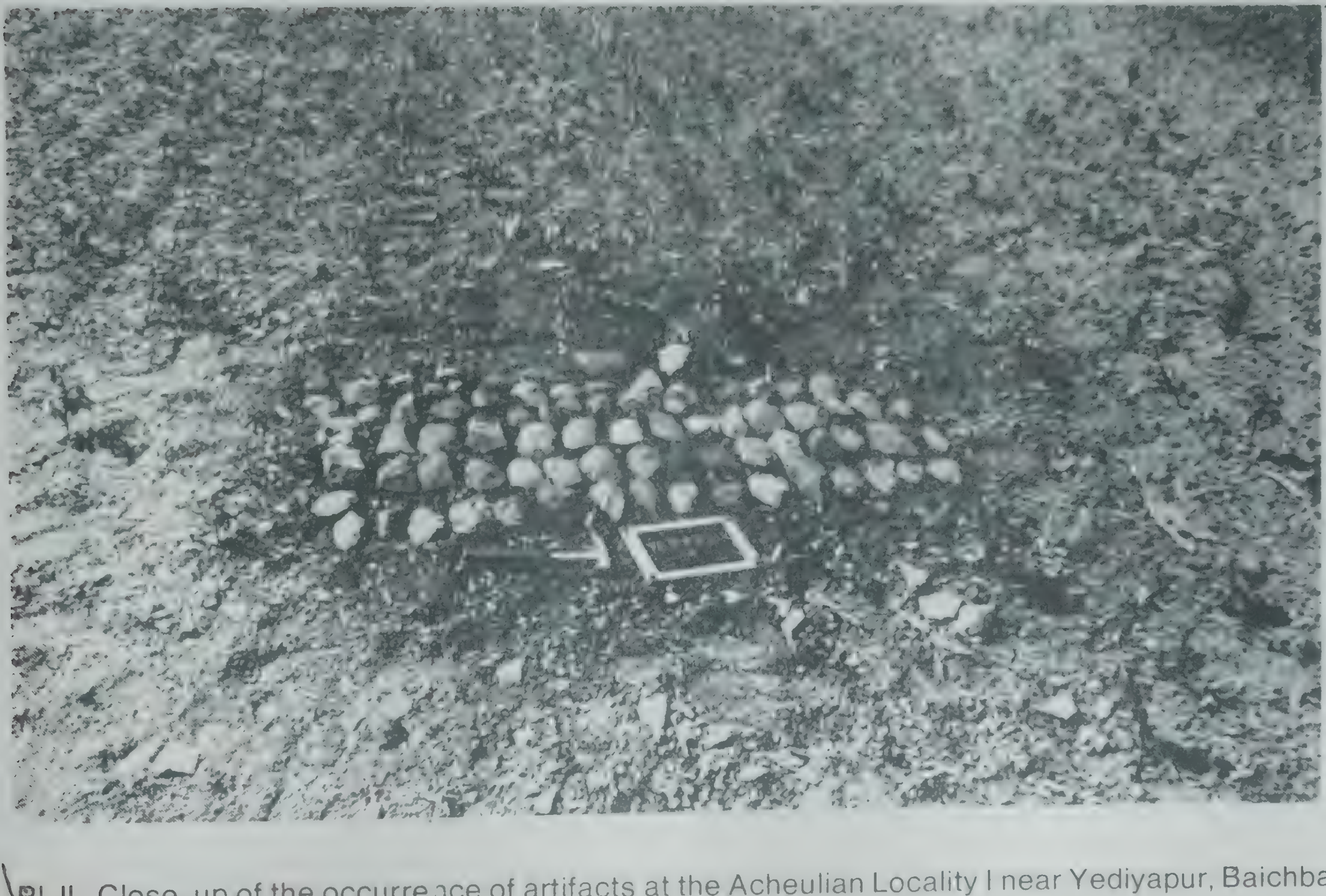
The Nittur site, discovered in 1964 (Ansari 1970), lies about 5 km. west of the town of Tekkalakota. Here Ansari noticed on the right bank of Tungabhadra a pebbly gravel horizon (35 cm. thick) under a layer of dark brown silt. He obtained Middle Palaeolithic artifacts from the gravel horizon. Most importantly, Ansari found patches of loose bouldery gravel exposed in the bed of the river. He obtained fossilized animal bones and pebble tools from this gravel patch. The fossil collection consists of about 30 identifiable pieces (vertebrae, scapulae, skull, jaw, rib and limb fragments) which mostly belong to *Bos namadicus* (Sathe, Salahuddin and Badam *in Press*). The artifacts are made of dolerite and haematite quartzite. The collection includes 11 unifacial choppers (with straight, convex or pointed working edges), 13 bifacial choppers (with convex, round or straight cleaver like edges), 2 flakes and 5 waste products.

It must at once be admitted that the collections from the two sites are both small and into the Acheulian phase of this central Krishna basin (Pls. I to IV). First it appears possible to distinguish two developmental phases within the culture. The early phase is represented by sites where the cultural horizon occurs directly on the bedrock. The artifacts from these sites are characterized by thick crosssections, irregular outlines and crude workmanship. It is to this tradition that the Bellary assemblages also seem to belong. In the case of sites belonging to the late phase the occupation horizon is associated with brownish clay overlying bedrock. The refinement in artifacts consists not only of improvements in the manufacturing techniques (thin sections; symmetrical artifact out lines and shallow flake-scars) but also of appreciable reduction in the sizes of artifacts.

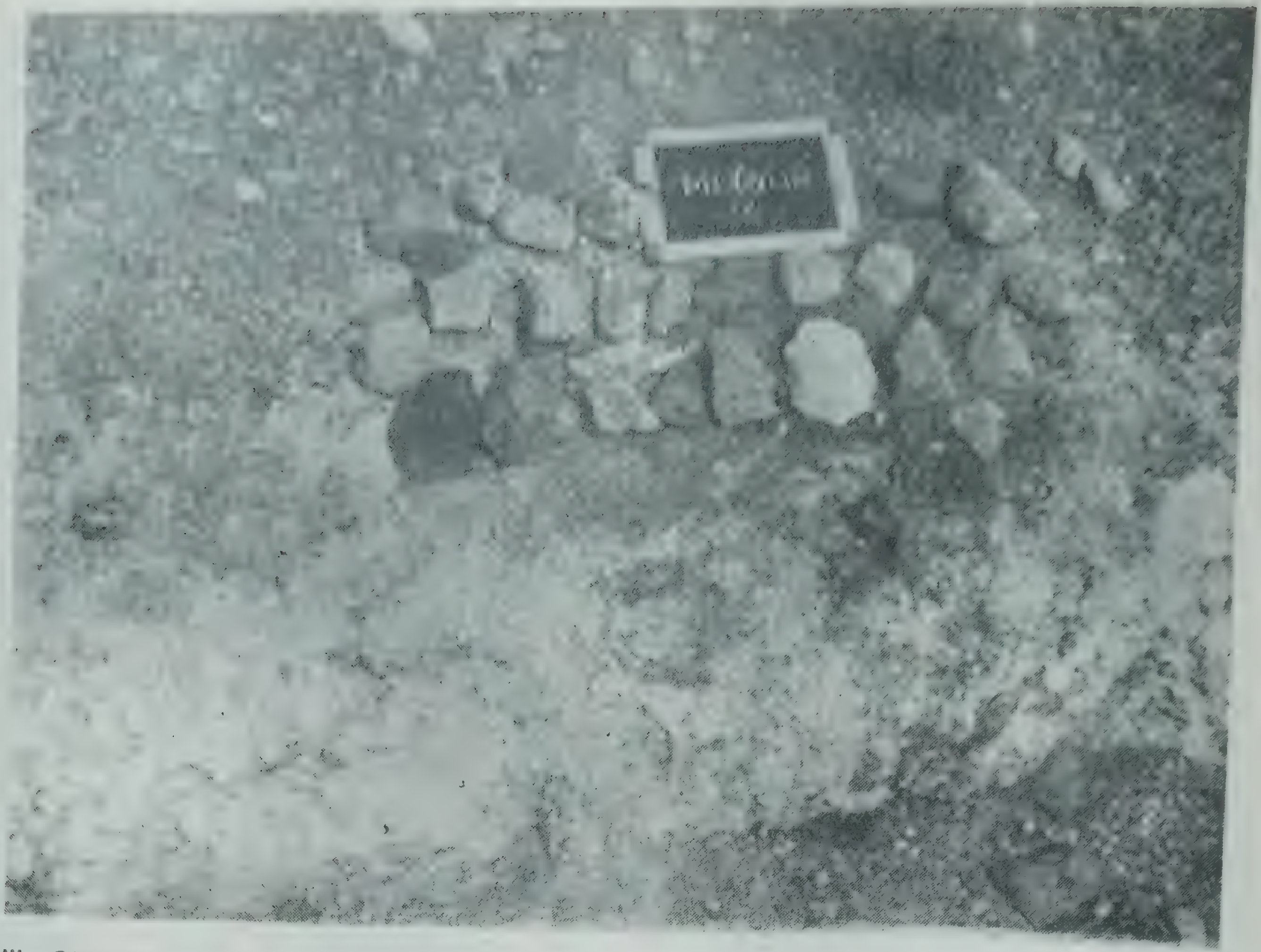
Secondly, some of the sites in the Baichbal valley (some occur even in the Hunsgi valley) have yielded fossil fauna along with stone artifacts (Paddayya 1985, pp. 653-58). This is the best known instance in the country of the occurrence of faunal material from primary sites of the Lower Palaeolithic phase. The species represented belong the *Bos Equus* and *Elephas* genera. Considering their cooccurrence with stone artifacts, it is clear that these bones belong to animals which were exploited by the Stone Age groups for food purposes. Thirdly, some of the sites are quite extensive and efforts are being made to understand the possible patterns in the intrasite distribution of artifacts and fossil material. Fourthly, while limestone is no doubt the major raw material at most of the sites, there are sites where other rocks like schist and dolerite available in the immediate vicinity were freely exploited. These instances and the evidence from Bellary cited earlier disprove the views of previous workers that Lower Palaeolithic occupation was governed by the availability of suitable raw materials; on the contrary, it now appears certain that man was able to exploit all possible rock types. Finally, it is now possible to date the culture in a relative way. Dr. (Mrs.) Kshirsagar's work has shown that the flourine/phosphate values of the fossil bones are quite high (6.3 to 8.3), whereas the bones from Neolithic sites in the same area are extremely low (0.22) (Joshi and Kshirsagar 1985). This wide margin between the values surely indicates a high antiquity for the Acheulian culture.

From the foregoing account it is sufficiently clear that the central Krishna basin is extremely rich in the remains of the Lower Palaeolithic phase. What is presently known now seems to be but only a fraction of the evidence actually available in the area. Systematic investigations are carried for in the Bellary area both to obtain further evidence in respect of the pebble-tool tradition and to understand the Acheulian culture of the Copper Mountain Zone from a settlement system point of view. The writer would like to hazard the guess that even the Raichur doab, which is at the moment a *terra incognita* from the point of view of the Lower Palaeolithic phase, has wide scope for Stone Age studies. In fine, the future studies may well show that the central Krishna basin, just as it occupies a prominent place in respect of the Neolithic studies, played a crucial role in the origins and growth of Stone Age cultures of Peninsular India.

Pl. I General view of the Acheulian Locality at Yediyapur, Baichbal valley, Gulbarga Dist.



Pl. II Close–up of the occurrence of artifacts at the Acheulian Locality I near Yediyapur, Baichbal valley, Gurbarga Dist.



Pl. III Close-up of the Acheulian Locality IX near Mudnur, Baichbal valley, Gulbarga Dist. – showing the occurrence of animal fossils along with stone artifacts

Pl. IV General view of the Acheulian Locality X near Mudnur, Baichbal valley, Gulbarga Dist. – showing the occurrence of artifacts in brownish clay

4 QUATERNARY ENVIRONMENT AND PALAEOLITHIC CULTURES OF THE GHATAPRABHA BASIN, KARNATAKA.

R. S. Pappu

INTRODUCTION

The Ghataprabha basin in the Karnataka State is well known for its continuous cultural development from prehistoric to historic times. This region has also preserved Quaternary alluvial deposits which are mostly confined to present day river valleys. The discovery of fossil remains of rhinoceros *(Rhinoceros deccanensis)* by Foote (1876) in the alluvial deposits near Gokak in Belgaum district established the existence of Quaternary formations in the Ghataprabha basin. There was a big lull nearly for a period of more than 75 years after Foote's pioneer work. Malwad and Sankalia (1956, pp. 5-6) carried out explorations around Bagalkot town in Bijapur district in the lower reaches of the river valley and brought to light evidence from a few sites of Lower and Middle Palaeolithic cultures. A large collection of Middle Palaeolithic tools from the same region was made by Banerjee (1957) mostly from the modern bed of the Ghataprabha. Sali (1973, p. 82.) collected a few tools of Lower and Middle Palaeolithic industry at Sutkatti near Belgaum in the middle reaches of the river valley. A detailed geoarchaeological investigations were undertaken by the present writer in the upper Krishna basin for his doctoral dissertation (Pappu, 1974) and as a part of this work, some parts of the Ghataprabha valley in its lower reaches was investigated. This resulted in a discovery of a number of Lower and Middle Palaeolithic sites in primary and semi primary context. Against this background, geoarchaeological investigations were planned and carried out in recent years by the present writer in the entire Ghataprabha basin. The present paper gives in brief the results of these investigations which were undertaken with the main aim of understanding the Quaternary geomorphic history of the basin and also to assess the prehistoric potentialities of the region.

PHYSICAL ENVIRONMENTS

The Ghataprabha basin includes parts of Kolhapur district of the Maharashtra State and Belgaum and Bijapur districts of the Karnataka State. It covers the area mainly drained by the river Ghataprabha and its major tributaries like Hiranyakeshi, Tamraparni and Markandeya. The basin is confined approximately within the Latitudes : 15° 45′ N—16° 30′ N and Longitudes : 74° 00′ E—76° 00′ E. The river Ghataprabha originates on the eastern slopes of the Western Ghats at an altitude of about 950 m AMSL, in the Chandgad taluka of Kolhapur district. It is one of the major Southerly tributary of the Krishna and has a total course of about 260 km. The river in general follows an easterly course upto a distance of 210 km from the source and then abruptly takes northeastern turn to meet the Krishna. The average gradient of the river from the source to its confluence with Krishna is 1.45 m per km. The major irregularity in the course of the river is marked by a waterfall of 60 m height at Gokak in Belgaum district. The drainage of the basin is in general of dendritic pattern being only locally disturbed by parallel or trellis pattern.

Geologically, the Ghataprabha basin is covered by three main formations of the Peninsula namely, the Archaeans, Kaladgis and the Deccan traps. Among these the last two are of widespread occurrences throughout the basin. The Archaeans which occupy a small portion in the lower reaches of the valley are made up of a complex series of metamorphic rocks like schists, phyllites, quartzites and granite gneisses.

The rocks of the Kaladgi series come next in succession and are confined to middle and lower reaches of the valley. These are made up of quartzites, sandstones, limestone, shales and conglomerates (Ram Rao, 1961). The Kaladgis at places display horizontal bedding while at places are intricately folded. The quartzites form the major prevalent rock type in the region. The quartzites being harder formations are resistant to weathering and in general appear as steep cliffs and escarpments. The Deccan Traps cover the major portion of upper and middle reaches of the basin. These are represented by the varieties of basalts and intrusive dolerite dykes of the Cretaceous Eocene periods. Traps are almost horizontally bedded lava flows. They show very slight tilt towards the east. Besides these, the other geological formations are laterites and Quaternary deposits.

The Western Ghats also called Sahyadris running in northwest–southeast direction and its major off-shoots stretching in east and southeast form the major hill complex of the region. There are also isolated residual hills especially in the lower reaches of the Ghataprabha valley. The Ghataprabha basin as a whole is confined between the altitudes varying from 1000 m to 550 m AMSL. Well developed planation surfaces are conspicuous in the basin and occur at elevations from 1000 to 550 m AMSL both on the Deccan Trap as well as Kaladgis. These surfaces seem to have been originated due to Tertiary tectonic movements of epeirogenic type and climatic changes (Dikshit, 1970, pp. 236–252). Similar types of planation surfaces have been noted all over the Peninsula (Vaidyanadhan, 1977, pp. 13–35).

Climatically the basin experiences a typical monsoon climate. The crest of the Western Ghats and their immediate slope to the east receive rainfall of the order of 500 to 800 cm. The rain fall diminishes very rapidly eastwards and in the lower reaches of the Ghataprabha around Mudhol and Bagalkot, it varies from between 50 to 75 cm. This part of the basin can therefore be classed as semi arid. The distribution of the rainfall is thus mainly controlled by the physical features of the region.

FIELD STUDIES

A. Laterites

In the region under study, planation surface occurring at elevation between 950-800 m and 650-550 m have been capped by laterite deposits. Laterites have developed on Deccan traps in the source region on higher planation surface and on Kaladgis in the present semi-arid region around Bagalkot on lower planation surface. Depth of laterites developed on higher surface varies from 10 to 30 m and laterite profile shows characteristic three layered structure viz. massive vermiform crust capping lithmarge which passes into weathered basalt. Extensive laterite outcrop was also observed in an area of 8 to 12 sq km around Anagwadi village situated 13 km NW of Bagalkot town. The exposed sections and freshly dug well revealed that the depth of laterite varies from 5 to 25 m The laterite profile at places displays presence of crust, mottled and pallid zones which gradually pass into weathered ferruginous shale.

B. Alluvial Formations

The region under study had preserved sedimentary deposits of fluvial origin. These are confined to the present river channels and are not more than 10-12 m thick and 1–1.5 km in lateral extent on either banks. The exposed alluvium is divisible into Older Alluvium and sub-Recent or Younger Alluvium. The former occurs as discontinuous patches and is made up of caloreted yellowish brown silt associated with pebbly and sandy gravels. The Younger Alluvium consists of less calcareous clayey silt associated with sandy pebbly gravels. Two cut and fill terraces at 10 to 12 m and

6 to 8 m above the modern bed levels of the rivers are commonly seen. The lower (younger) terrace is inset into the higher (older) terrace.

C. Cultrual evidence

The entire Ghataprabha river valley and some parts of its tributaries namely Hiranyakeshi, Tamraparni and Markandeya and also parts of the Vedganga were explored and 40 sites yielding lithic industries were located in different parts of the basin. The sites are classified into two categories namely alluvial sites and surface sites. In the former, the artifacts, fossils and occupation floors are associated with riverine deposits and in the latter, cultural materials are found at the surface and not within or beneath sediments deposited by some geomorphic agencies.

The evidence for the Lower Palaeolithic industry was obtained from 21 sites in the region. Majority of the sites are concentrated in the region between Mudhol and Bagalkot towns where there is good development of quartzite formations of the Kaladgi series. In particular there is heavy concentration of the sites around Bagalkot in the lower reaches of the Ghataprabha valley. Alluvial category of sites were found throughout the basin. The sandy pebbly gravels occurring at the base of the older fills have yielded tools of Lower Palaeolithic Acheulian industry. Among these the site of Anagwadi (75° 40′ E, 16° 15′ N) is unique and has provided ample evidence of Lower Palaeolithic industry of Mid-Acheulian tradition. The tool kit consists of varied and numerous forms of handaxes, cleavers, and also other tool types like discoids, scrapers, choppers, etc. The artifacts recovered from here are in mint condition thereby suggesting that archaeological material is relatively in undisturbed position. Anagwadi thus represents an Acheulian channel occupation site in semi-primary context. A large number of surface sites lacking geological context were also located in the same region. These are confined to pediment surfaces occurring at the foot of the Kaladgi hills. Gently sloping pediment surfaces are veneered with angular detritus and are littered with finished and unfinished tools and also several cores, flakes and innumerable chips indicating factory debris. These rich Acheulian surface sites therefore are essentially *in situ* occurring in relatively undisturbed context and represent open air occupation-cum-factory sites.

The evidence for the succeeding Middle Palaeolithic industry comes from 38 sites in the basin situated in different reaches of the basin. However, sites are concentrated between Mudhol and Bagalkot towns in middle and lower reaches as in case of preceding Acheulian industry. There is heavy concentration of sites between Yadwad and Lokapur towns where there is best development of limestone formations. Chert, a preferred raw material of this industry occurs as veins or bands in limestone formations and is available in plenty in this tract. These sites are situated far away from the main channel (about 4 to 8 km) and are located in the close vicinity of cherty outcrops. These are, therefore, surface factory sites. The tools of the industry mainly consists of scrapers, points and borers. Tools of Middle Palaeolithic industry were also collected as surface finds from modern point bar channel gravels at a number of sites.

The assemblage from the site of Yadwad (75° 13′ E, 16° 15′ N) is predominently made on blades and includes scrapers, points, flakes, worked flakes, simple and backed blades, a few burins and cores. The assemblage is very well comparable with similar Upper Palaeolithic assemblages reported from other parts of the Peninsular India.

DISCUSSION

A. Laterites

Laterities have developed both on higher planation surfaces occurring at elevation of 950 to 800 m AMSL in the source region and on lower planation surfaces at elevations of 650 to 550 m in the lower reaches of the river Ghataprabha around Anagwadi. In the absence of any datable material associated with the laterites, it is difficult to assign precise age for the process of laterisation. However, relative age can be assigned on the basis of geomorphic evidence. It appears that laterites on higher planation surfaces are of early Tertiary age as these surfaces are post-Deccan Trap in age. The laterites on lower planation surface around Anagwadi have depths varying from 20 to 30 m. There are no foreign rock constituents within these laterites and therefore they are not of secondary or detrital origin. The primary nature of the laterites is further confirmed by the chemical analysis of the samples collected upto a depth of 10 m from the surface. $SiO_2/A1_2O_3$ ratio is less than 1 and is suggestive of strong leaching of silica and subsequent concentration of sequioxides (Pappu and Rajaguru, 1979, pp. 41-43). These observations suggest that these laterites are of ground-water type which seem to have developed within the zone of fluctuating water table associated with gently sloping land surface (Maignien, 1966).

The laterite surface at Anagwadi is confined in between two surfaces namely the Kaladgi surface at elevation of 700–650 m of late Tertiary age and late Pleistocene alluvial surface at elevation of 600-550 m. The laterite outcrop is therefore younger than the late Tertiary Kaladgi surface and older than the late Pleistocene alluvial surface. Field relationship between two morphological units namely laterite surface and alluvial fill surface indicate that these landform units are not separated by significant time gap. There is conformable relationship between the deposits of the alluvial surface and disintegrated products of the laterite surface. The late Tertiary or early Quaternary (Neogene) age can be assigned to Primary laterites around Anagwadi and these are younger than those found on higher planation surfaces in the source region of the Ghataprabha. The laterites around Anagwadi form part and parcel of similar laterites observed in the present semi-arid parts of the Deccan Peninsula at Badami in the Malaprabha valley (Pappu, 1981), at Bidar in the Manjra valley (Joshi *et al*, 1979) at Vite, Miraj and Jath in south Maharashtra (Umarjikar, 1984). Occurrence of laterites in the present semi-arid region is quite significant for understanding palaeoclimatic conditions. It appears that laterites observed suggest change in the "soil-climate" most probably in respect to somewhat more humid climate than that of the present. The region might be experiencing 3 to 4 times more rainfall than that of the present. These studies have shown that there are laterites of different ages in the Deccan Peninsula and it is wrong to group them under a single geological period.

B. Quaternary history

Older valley fill deposits represent a major aggradational phase in the basin and are most cospicuous Quaternary formations observed in the area. Two major cut-and-fill episodes were observed in the history of the river during late Quaternary. The older fill is of late Pleistocene age on the basis of geomorphic, palaeontological and a few radiocarbon data available in other parts of the Deccan Peninsula (Rajaguru 1970). Younger, sub-Recent fill belongs to early or mid-Holocene period. The rivers seem to have change their grades at least twice in response to variation in discharge sediment load relationship, most probably caused by milder climatic changes and non-tectonic activity during late Quaternary. Presence of kankars in alluvial deposits, brownish colour of finer sediments as a result of strong oxidising environment and abundance of montmorillonite type of clay minerals in fluvial sediments show that hot semi-arid environment prevailed throughout late Quaternary in the river basins of the Deccan Peninsula (Rajaguru, 1973, pp. 80-87).

The Quaternary history of the Ghataprabha basin is represented by well preserved late Quaternary alluvial fills and early Quarternary laterites developed on planation surfaces and may be summed up as in the Chart below.

C. Environment

The Palaeolithic sites occur in varied geomorphic situations and are widely distributed throughout the investigated region. Majority of the sites, however, are essentially confined to riverine environment. Totally undisturbed sites are as yet very scarce. A few Acheulian sites of channel category and a few of rock shelter and cave category have relatively preserved evidence in original primary context. It is evident from the available evidence that certain regions in the Ghataprabha river valley were preferred for habitation by Palaeolithic men.

The hilly mountainous rugged terrain of the Western Ghats and their immediate eastern slopes covered with thick forests and characterised by heavy rainfall were avoided for habitation by Acheulian man. The region characterised by semi-arid monsoonal climate with suitable physiographic setting in the form gentle plateau and broad pediments cut by shallow broad bed load streams and sparsely forested savana type of vegetation in the lower reaches of the river valleys around Bagalkot town was preferred for settlement. The sites are heavily concentrated in this region. The habitational preferences very well tally with similar situations in other parts of the Peninsula in

Litho Units	Probable Climate	Cultural material	Probable Age
1. Younger Alluvium. Non calcareous silts and gravels	Semi-arid monsoonic	Mesolithic	Early Mid Holocene
2. Older Alluvium. Calcareous brownish silts and gravels	Semi-arid monsoonic with frequent storm rains	a. Upper Palaeolithic b. Middle Palaeolithic c. Lower Palaeolithic	Late Pleistocene a. 20,000–10,000 yrs. B. P. b. 40,000–20,000 yrs. B. P. c. More than 40,000 yrs. B. P.
3. Laterites	Sub-humid monsoonic	…… …………	Late Tertiary to Early Quaternary.

Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh and Tamilnadu.

The distribution of Palaeolithic site is also closely related to geological formations. The Lower Palaeolithic Acheulian man has always shown preference for quartzite as raw material in preparing his tools. Quartzites of the Kaladgis show their best development around Bagalkot town and there is heavy concentration of Acheulian sites around this town. The Middle and Upper Palaeolithic men preferred fine grained silica family minerals such as chert, jasper, etc. and there is heavy concentration of these sites between Yadwad and Lokapur towns where there is best development of chert formations.

The Middle Palaeolithic occupation in the region was much more extensive and intensive than that of the Lower Palaeolithic culture. This is evidenced by the widespread distribution of sites of this culture. The Middle Palaeolithic man ventured into territories away from the river banks and occupied hill tops, slopes, caves, forested heavy rainfall regions and also semi-arid regions, and was thus adapted to a variety of environments.

The present investigations have shown that the geomorphic history of the Ghataprabha valley is intimately connected with the activities of the Palaeolithic man. The region between Mudhol and Bagalkot towns in the middle and lower reaches of the river was most favoured landform and major culture area during Lower and Middle Palaeolithic times. Plateau country, open forests congenial semi-arid monsoonic climate, presence of rich outcrops of preferred raw materials, perennial water supply and perhaps abundant game were the main environmental factors responsible for the development of Palaeolithic cultures in the middle and lower reaches of the Ghataprabha valley.

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5. ENVIRONMENT ASPECTS OF EARLY AND MIDDLE PALAEOLITHIC CULTURES IN SOUTHERN KARNATAKA

Dr. T. V. Shivarudrappa

Karnataka was the abode of man since the early palaeolithic period. Early investigations concentrated mainly on the discovery of sites, typology material of the artefacts and correlation. Very little work has been done on the environmental reconstructions of the palaeolithic sites. Hence the former Director General of Archaeological Survey of India, Sri. M. N. Deshpande (1978) rightly pointed out that "for the proper understanding of Karnataka Archaeology, we must go back to the dim and distant past, when man, the tool maker was struggling with the environment to carve out a precarious existence, roaming on the river banks and living in rock shelters."

Robert Bruce Foote has been rightly called the father of Indian Archaeology, who laid a firm foundation to Archaeology of Karnataka by discovering many sites of stone age industries. His pioneering work in Southern Karnataka (1881, 1901, pp. 1-131) alone has brought to light eight sites. After a lapse of many decades six more new sites are reported by the following : Sampath Iyengar and Rama Rao, (1924) and later studied by Seshadri, (1956, pp. 1-105) (Kibbana Halli, Biligere and Karadigudda) : Sreepada Rao, (1930, pp. 1–8) (Ranganathapura) : Nagaraju *et al.* (1975,) (Ranganathittu) ; Gururaja Rao and Shivarudrappa (1985, pp. 1-12) (restudy of Kibbanahalli-Biligere, and new find of Mysore City and Talkad) : Shivarudrappa, *et al.* (1983, pp. 1–10) (Naravi Valley–western ghats) (Table 1).

An attempt is made by the present author to describe in detail all the 14 sites reported from Southern Karnataka, with their geological setting, geomorphic land forms, the raw materials used for the artefacts ; besides, the probable environmental reconstructions.

Historical Background

Karnataka craton or Mysore plateau forms the oldest land mass within the peninsular shield, which remained a stable landmass from 3000 million years. On this cratonic block the geomorphic processes have left their imprints in the form of plains, valleys and plateaux (erosional or degradation features) and also river alluviums, colluviums, laterites, soils, sand dunes and pebble beds (depositional or aggradational land forms) of those two the latter land forms are the great repositories of archaeological interest, since they were formed either in the Quaternary or in recent periods of earth's history. The former land forms (erosional) have a geological antiquity of Mesozoic or Tertiary age Demangeot, (1975; pp. 229-272) Sadakata, (1980, pp. 161–174, 1984; pp. 209–218). Together with climatic and monsoonic changes, accentuated by chemical and physical weathering have changed the old surfaces and sculptured the landmass into the present topography. Some of the alluvial and colluvial deposits of the older land forms were recycled.

Physiographically the Mysore Plateau (1.83 lakh sq. km; extends from 11° 36′ to 18° 26 N and 74° 35′ to 78° 48′ E) can be divided into three distinctive units namely; the coastal plain, the malnad or hilly country and the maidan region with rolling plains. Each unit consists of different terrains of uniform geological character which is designated the province. Mysore plateau consists of two major provinces– (1) Northern Karnataka terrain– with younger rock units- precambrians (Kaladgis, Bhimas and Deccan Traps) form one geological province. The green stone belt (Dharwar) and the high grade granatitic belt (Sargurs) form the (2) Southern Karnataka province.

From the geo-archaeological and utilitarian point of view these two terrains may be quantified on the basis of palaeolithic attributes as, the early and the middle palaeolithic province– Southern Karnataka, and the other with middle palaeolithic and mesolithic artefacts characterise the northern Karnataka province. This is further corroborated by works of : Burkitt and Commiade, (1930, pp. 327–329 ; 1932) Sankalia, (1946, p. 336, 1964) Subbarao, (1948, pp. 1–62); Allchin, (1952, pp. 228-271, 1957); Seshadri, (1955; pp. 271-297 ; 1956; pp. 1–105); Joshi, (1955, pp. 1-112, 1978); Bannerjee 1957); Paddayya, (1967, pp. 71-78; 68, 70, 75, pp. 8–121; 78); Pappu, (1978); Agarwal, (1978; pp. 129–148); Soundararajan and Sundara (1960–61; pp. 64–72) and Shivarudrappa (1979, pp. 52–60; 1983, pp. 51-56).

Attempts have been made by a host of geologists and geomorphologists to elucidate the terrain evolution and environmental set up of the Mysore Plateau. Relevant data pertaining to the above mentioned aspects can be obtained from the following investigations. From a detailed geomorphic analysis and parameters, Budel (1965; pp. 93-95, 825, 33), established clearly that the region between Bangalore and Madras consists of a structure–Ramftrappe or a stepped–surface, and Bangalore is situated on an old erosional surface. A detailed geomorphic map of the Mysore plateau along with its pleistocene climate (warm and humid) has been done by Bruner (1968; pp. 1–17). Origin, evolution and mineral resources of Mysore plateau has been exclusively dealt with in a series of papers on the western ghats and also on the antecedent drainage of the river Cauvery by Radhakrishna (1952; pp. 1-56; 1955; p. 15; 1964, 1977). Two well-known German geomorphologists Writhmann (1971) and Seuffert (1973; pp.242 59) published a detailed account of the various land forms of the Western ghats and suggested a warm humid climate for the formation of laterites during pleistocene.

Recently many explorations on the western ghats from the view point of land use pattern (Fuziwara, 1982, pp. 3–14) geomorphology (Sadakata, 1982, pp. 209–218) Subramanian and Mohamad Ahmad, (1985); ecosystem Saldana (1985, pp. 1–170); Subramanian (1985); Rajagopalan (1955); Ranganna *et al* (1985) ; Sadatipour and Sreedhara Murthy (1985); Sripathi Rao *et al* (1985) ; Jos (1985) ; Damodaran, (1985) geoarchaeology (Shivarudrappa, 1983) and many other investigations by National and International teams are in progress.

Similar investigations on the Western ghats of Kerala and Konkan (Goa-Bombay) sectors have been done by Dixit (1976, pp. 79–105) indicating a polycyclic processes for the land forms. Coastal studies and research on the laterites of entire Western ghats have been carried out by Nielson (1972, p. 307) Sriram and Prasad (1979, pp. 1–6) on the lateritic terrains of Goa coast ; Sambandam and Prasad (1981, pp. 246–253) on the erosional surfaces of Kerala hinterland (Pliocene to Miocene) ; Karunakaran and Sinha Roy (1981, pp. 222–231) on the erosional surfaces of Kerala coast. Geomorphic evolution of coastal latarites of South Kanara (Mangalore) has been worked out in detail by Sadakata (1984, pp. 209–218).

In recent years Kathiwar and Saurashtra coastal areas have been extensively studied by many workers from the geomorphological and archacological point of view. Consequently a clear picture is available from these investigations ; Chatteriee (1962, pp. 47–56) recognised six levels of marine terraces on the Indian coasts, which are correlatable to European (Mediterranean) quaternary stratigraphy (Scilian, Milazzian, Tyrrhenian, Monastirian, Cambian and Flandian). He substituted the term "Konkanian" for Flandian. Based on the C_{14} analysis Gupta (1972, 1977) recognised the raised beaches and sealevel changes along the Saurashtra Coast. According to him the changes occurred during 6000, 30,000 and 120,000 years B.P. The chronology of early man in Saurashtra (Marathe and Rajaguru, 1982) ; Sood *et al.* (1982; pp. 3–12) on Kathiawar coast, and Gudrun Corvinus *et al.* (1983) have shown the geomorphic and palaeoclimatic changes during quaternary on the hinterland (river vallyes) of Western Maharashtra.

Noteworthy contributions have come to light as a result of researches carried out by palaeontologists on the pleistocene fossil localities of India. Based on the vertebrate fossil study, Badam (1977; pp. 71-82) has been able to establish the dividing line between the pleistocene and pliocene deposits of India, besides a correlation to other parts of the world. His paper included the type localities of Extrapeninsular–Karewas (Kashmir), Siwaliks (Panjab) and areas of peninsular India namely Narmada basin, the Deccan river valleys and Kurnool caves. On the same lines the following works of Khosla *et al.* (1982, pp. 361–371) on ostracodes ; Geeta Desai and Shringarpure (1982, pp. 372–377) on foraminifera ; Chhaya and Patel (1982, pp. 378-389) on corals ; Oza and Shringarpure (1982; pp. 390-95) on geobotanical significance of quaternary shore line of Saurashtra are worth mentioning.

From the above review it is interesting to note that more significant contributions have come on the quaternary history of Saurashtra, Konkan areas. But no systematic account is available on the quaternary environments of Southern Karnataka province and of the western ghats of the same province. Hence an attempt is made by the author to describe 14 sites of southern Karnataka with their palaeoenvironments (Table 1).

Description And Environmental Reconstructions

While describing the 14 sites of lower and middle palaeolithic periods of southern Karnataka, for the sake of convenience and easy reference the same serial numbers shown in table 1 is maintained. The serial nos. 1 to 6 that have been reported by Robert Bruce Foote will be dealt herewith their geological settings, land farms and other parameters used to reconstruct the pattern of environment. The remaining sites (sl. no. 8 to 14) are dealt as the 'case study areas'.

Robert Bruce Foote (1881; pp. 1-131; 1901) discovered and described about 26 artefacts from the six sites in southern Karnataka (sl. no. 1 to 6, Table 1) with regard to their environment, he opined that there was not much change from the present day. However the present author by considering geological, geomorphological setting along with other parameters was able to reconstruct the probable environment of these sites (sl. no. 1–6) as follows :

(i) Generally the sites are located on a firm dry ground (the exfoliated granitic domes) as at Nidaghatta (western dome 993 m), also at Lingadahalli. These two sites are surrounded by monadnocks. The river Vedavathi flows, 2.5 kms. west of these two sites. During the flood seasons the palaeolithic man might have used the land forms–Incelbergs and domes as the 'low flood risk' areas and also to view the sites alround. Hence serial nos. 1 and 2 along with 5 and 6 can be considered as paired sites with proximity to the river Vedavathi. From the geomorphic sections the possibility of lakes to the North of Lingadahalli and to the south of Nidaghatta, formed the source of water. Therefore sl. no. 1 and 2 are optimal locations (2.5 km. distance between them) with defensibility and dry firm ground for the open camps (Fig. II, 1 and 2).

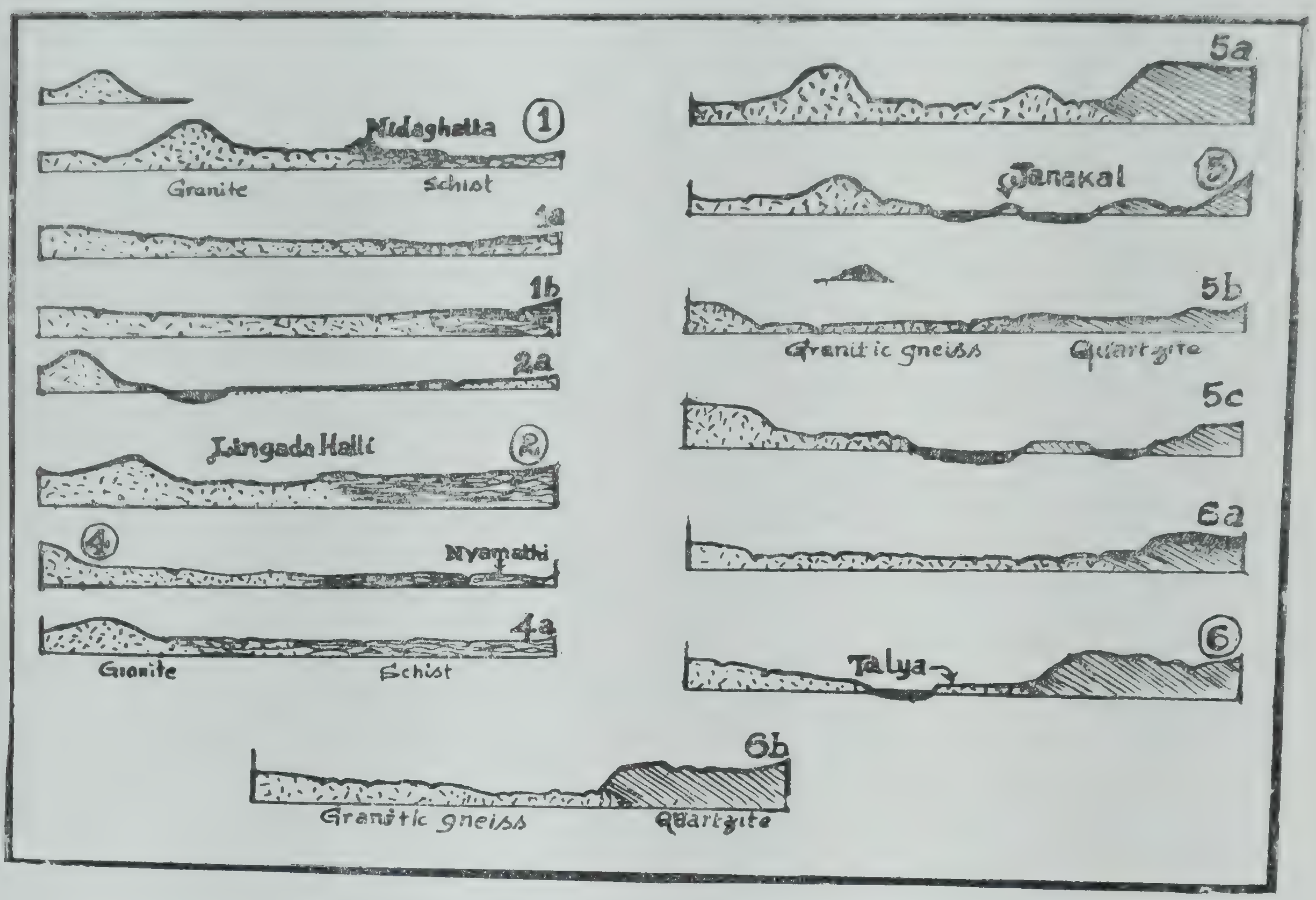

Fig. II. Location of sites and land forms.

(ii) Radial drainage pattern (with 3rd and 4th order) is a common feature of sites (sl. no. 1, 2, 3 and 4) which was advantageous to obtain dry ground, besides, the pediment slopes and valleys.

(iii) Convergent drainages helped in the formation of lakes (sl. no. 5 and 6) as at Janakal and Talya (Fig. II, 5 and 6).

(iv) These six sites (sl. no. 1 to 6) are located in the regions of interfluve, itramontane and alluvial tracts, on the contours between 930 m to 950 m.

(v) The raw material for the manufacture of artefacts namely quartzite was available plentifully nearby these sites either in the valleys or along the pediment slope.

(vi) Forests, lakes, river valleys and pediplains grasslands were the common scenario.

(vii) Intimate association of artefacts with laterite debris is indicative of warm and humid climate (pluvial condition).

(viii) Kankar occurring as thin veinlets in the soil is suggestive of a very dry climate (interpluvial).

(ix) All the six sites (sl. no 1-6) described by Bruce Foote are classifiable under lower palaeolithic industry.

(x) Presence of salt pans indicate a dry arid climate, and swampy areas (as at Nyamathi, Nidaghatta, Lingadahalli, Janakal and Talya).

Karadigudda (sl. no. 7) is another site discovered and reported by Seshadri (1956). This site has to be investigated further to get more details.

During the regional geological survey and mapping, these two sites-Kibbanahalli and Biligere (sl. no. 8 and 9) were discovered by Samapat Iyengar and Rama Rao (1924). They also collected a large number of artefacts from the above sites and displayed them in the Museum of Geology Department, Central College, Bangalore. Later a large collection of palaeolithis were made from these sites by Seshadri (1956). Besides he gave systematic description, typology-and correlated the Kibbanahalli palaeoliths to those of Attirampakkam III, excepting the ovates. By comparison of the material, Sankalia (1946 ; p. 337) opined that Acheulian industry of Gujarat resembles that of Mysore (Karnataka). But very negligible work has been done regarding palaeoenvironment of the area.

Recently these two areas are being investigated by the author through an integrated project to explore the geo-archaeological potentialities and environment from the viewpoint of the palaeolithic cultural evolution (Gururaja Rao and Shivårudrappa, 1985 ; pp. 1-12). The preliminary results of the investigation are quite encouraging and a brief summary has been outlined here.

It is interesting to note that Kibbanahalli and Biligere (sl. no. 8 and 9) are the best known and well documented sites from among the 14 areas of Southern Karnataka. These two sites are located 3 kms. south-sout west of Kibbanahalli village on the national highway of Bangalore-Honnavar (B. H.) road ; and it is 6 kms to the north-west of Banasandra village.

Geologically the area consists of Dharwar rocks namely-peninsular gneisses, granites, pegmatites, and various types of schists (chlorite, Hornblende, Actinolite, and Tremolite schists) with Quartzites, iron stones and manganese horizons. Rocks belonging to Bababuddan and Chitradurga groups are also exposed in and around Kibbanahalli (Wetherell, 1901; Sampat Iyengar and Rama Rao, 1924). Recently a rare rock type namely 'komatiite' is reported

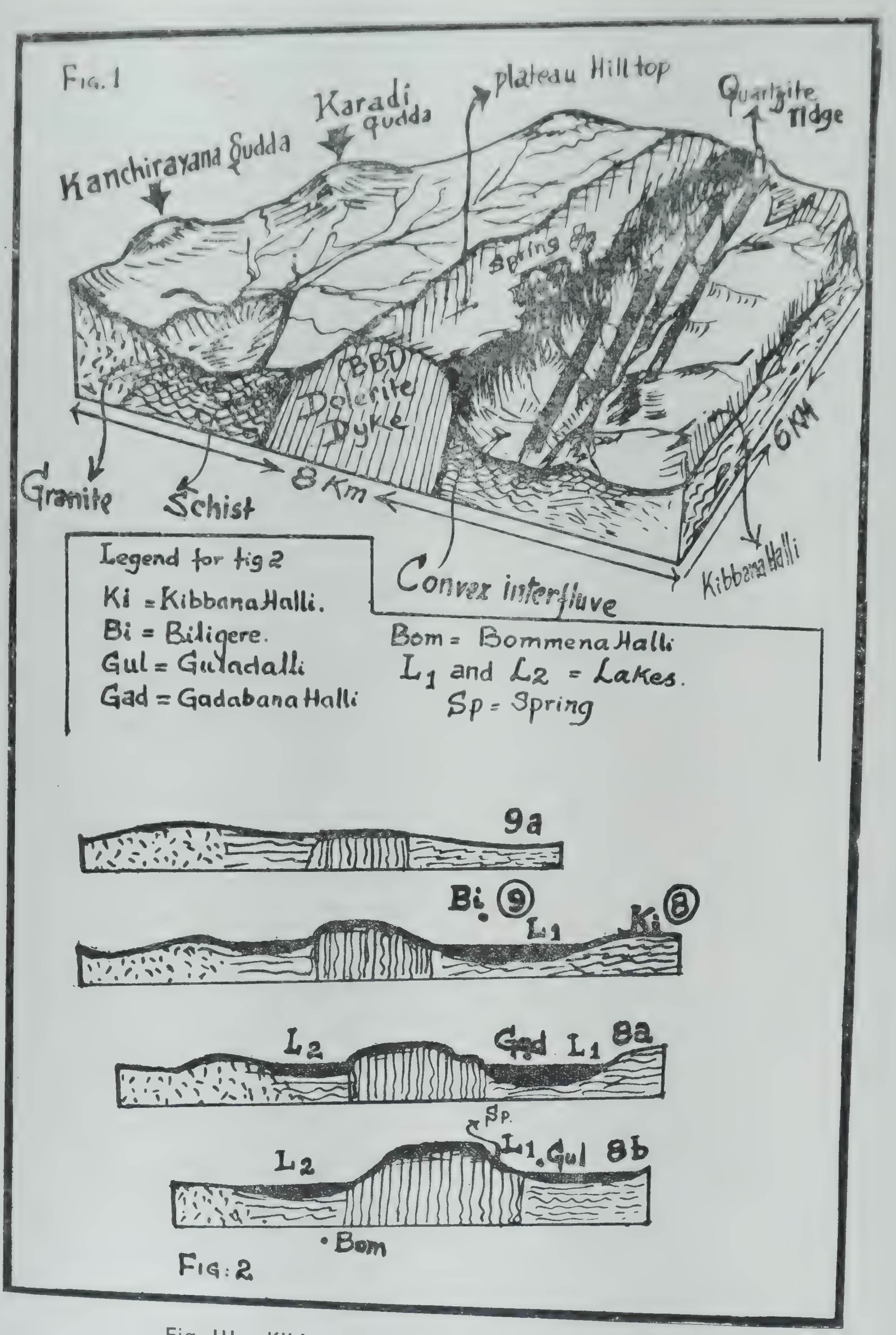

Fig. III. Kibbanahalli and surrounded hillocks

from Banasandra (Srikantiah and Bose, 1985; pp. 407-417).

Geomorphic cross-sections of the area show that Kibbanahalli is surrounded by small hillocks alround forming a depressed bowl or low lying area (Fig. III, 8). The Dolerite dyke (6 kms. long ½km. wide) intruded bowl or basin like structure in the centre giving rise to two large intramontane lakes in the part (L_1, L_2). For the sake of easy reference and description the dyke is named BBT dyke (Bommenahalli-Biligere-Tiptur dyke), which has three trigonometrical heights, 964 m, 953 m and 958 m. above the mean sea level. On either side of the BBT dyke the precipitous margins (75°) are abutted by pediment slopes (45°). These slopes decrease to 20° and finally to 10° at the centre of the basin(Fig. 1). For lake 1 (L_1) Guladalli forms the mid point and convergent streams of 3rd and 4th orders flowed in, to form a big lake of 10 kms circumference, situated to the north of BBT dyke, which formed the common embankment for L_1 and the southern lake L_2 (Fig. 1).

Lake 2 (L_2) to the south of BBT dyke was formed in a similar fashion like that of L_1. Towards the south-western margin of L_2 there are a series of three continuous, exfoliated, ellipsoidal granite domes (Kanchirayana gudda, Karadi and Arasikere granite domes) ; which formed firm grounds for camping like that of plateau of BBT dyke. The small tank that exists at Bommenahalli-Venkatapura is probably a small remnant of the former lake L_2. The peripheral pediment slopes around L_1 and L_2 might have been forest clad and marginal grasslands (up lands) sufficient to house forest fauna, and the grazing animals.

Besides, the twin lakes (L_1, L_2) there exists a pereninal spring at the northern margin of BBT dyke (between △964 and △958 m). Around the spring (Dhone) there are huge blocks of dolerite boulders, under which the palaeolithic man might have taken shelter from rains and sunshine; further it might have helped him as hide-out in game hunting and to spot the hunt. Quartzite, the raw material for the manufacture of implements, occurs as four parallel bands at the lower reaches of pediment slope (20°).

The soil catena (2.4 m to 4 m thickness), west of Guladalli shows three distinct layers of deep brownish red soil each separated by assorted, angular gravel debris of quartzite (2 layers), in which a good collection of *in situ* hand axes and ovates have been made (Fig. III, 1). The implements, angular fragments, and flakes of quartzite of the stone-age industries might have been washed into the lake from the surrounding upper reaches (i.e., Quartzite bands) by the then torrential rain splashes. Presence of alternate beds (layers) of gravel and colluvium indicate the intense pluvial condition. Further, laterite in the form of ferricrete is found as the top-most layer, which is indicative of warm, humid climate. Intercalation of kankar in the soil catena is an evidence for dry and wet climate. Now the area is in a semi-arid region.

From the above observations it may be said that Kibbanahalli-Biligere are the adjacent sites (interval of 2.5 kms); with no fluviatile environment, but with the Lacustrine, Savanna, warm and humid type and occarionally dry-wet, in association with the spring (Dhone) form an ideal open camp-site during the palaeolithic period. However a detailed investigation of paludal sediments as to their chemistry, pollen content, humus and other remains is under progress.

Ranganathapura (sl. no. 10) is a small village in Bannur Taluk of Mandya district. The course of the Cauvery after Srirangapattana is a braided one with a number of sand bars ; but an easterly flow is maintained. A change in the course at Hanagarahalli up to T. Narasipur is almost straight and narrow indicative of a fault plane. From this area a single-quartz implement (hand axe) was reported by Sripada Rao (1924). Recent visit to the area by the author was not very fruitful, since the river terraces have been extensively cultivated by modern methods of agriculture. However, fluviatile environment seems to have prevailed during palaeolithic period.

Before the fluvial island Srirangapattana there are two smaller islands namely Goutamgudda and Ranganathittu islands (sl. no. 11). A multidisciplinary team (Nagaraju, Shivarudrappa and Sadananda, 1978) could locate for the first time the palaeolithic industry in the uninhabited island of Ranganathittu. Implements are mostly flaked tools of felcite rock. A fluviatile island type of environment seems to have been there during the palaeolithic period.

The recent geo-archaeological investigation by Shivarudrappa and Gururaja Rao (1985; pp. 1-10) around Mysore city, (sl. no. 12), has brought to light for the first time two chalcedonic and one felcitic flake tools of middle palaeolithic age (collected west of Lecturers' quarters, Manasagangotri campus and between Tonachikoppal and Kuvempu Nagara), five small undulations running in the N-S direction from the rolling plains of the Mysore city. Manasagangotri campus is situated on the middle ridge. Laterite and kankar association with the ridges indicate a warm and humid climate followed by the dry and wet type.

Talakad (sl. no. 13) is a famous pilgrim and tourist centre in T. Narasipur taluk of Mysore district. There is voluminous literature on the history of Talakad. But there is no detailed account either of geology or archaeology of this area. To fill in this lacuna an interdisciplinary research project entitled ''Geo-archaeological implications of the Talakad sand dunes'' (Shivarudrappa and Gururaja Rao, 1985; pp. 1-10) was undertaken to unravel the origin, migration, age of sand dunes and river terraces from a view point of archaeology. The influence of the fluvial and eolian action over the formation of sand dunes, besides, the meandering and river terraces of the area are investigated.

An antecedent drainage and senility of the Cauvery river has been dealt by Radha-Krishna (1955; p. 15).

About 40 sq. kms., of the area between Bettahalli—Talakad—Malangi was selected for Geo-archaeological studies. The Cauvery river flows in a easterly direction after Srirangapattana following the contour 639 m. with a low velocity up to Bettahalli (△738). The monodnack hills(Mudukuthore) extending in the N-S direction from Bilijagali to Bettahalli and further as pediment slope up to Talakad, forming an obstacle (100 m to 30 m high) for the senile river Cauvery. Hence the river takes a sudden elbow bend (90°) and flows in a structurally controlled path (fault plane) forming a 'Z' shaped meandering between Bettahalli (△738) and Talakad (△639). The braided nature of the river and elevational difference of the area with change in lithology from gneisses to charnockites are causative factors for the meandering consequently the sudden elbow bends at Bettahalli and Malangi are seen in the area. Even the change in the flow direction, that is the normal easterly flow was changed to southerly flow (Bettahalli) and once again from south to east (Malangi). As a result of this change of flow direction the river looses its velocity and deposits the debris or sand on the left bank convex (Talakad) in the form of a point bar. The right bank (Malangi) is a concave one, here the erosion is faster'

Hence the erosional and depositional history of the 'Z' shaped meandering between Bettahalli and Talakad (6.5 kms) show that the sand bars, lavees and pebble beds are common all along the left bank. Such deposits of sands (size 60 m to 15 m) are transported by SW monsoonic wind and deposited against the temple walls that acted as obstacles, hence the 'sand dunes' are formed. Growth of the sand dunes depend on the lavees accumulation that is being catalysed by flood waters of the Cauvery and as well by cross winds. Dunes rarely exceed 20 m in height and cover an area of over 10 sq. kms. Fourteen layers of sand can be counted on the south eastern or leeward side which is 6.80 m high (Fig. IV photo 2). From the historical records the antiquity of the existing sand dunes of Talakad near the Pathaleshwara temple can be dated to 900 to 1000 years.

Besides the sand dunes the subsurface data (bore wells), the study of flood-plains and river terraces enabled the author to reconstruct the palaeoenvironment of the area. Recently six bore wells have been drilled (3 to 4 kms North of the Talakad dunes) to a depth of 20 to 20m below the present alluvium. It is worth noting that these wells provided not only high yield (10,000 gallons/hour) of water, but also the subsurface data that, alluvium and pebble beds are met invariably at a depth of 22 m from the present day surface. Similar instances at Kollegal, where boulders and Pebbels are met with at a depth of 30 m would prove the existence of older alluvium channel lags and also the changing path of the river Cauvery. It is contemplated to date the older alluvium by thermoluminescence method.

Many cross sections and the river terrace studies throw sufficient light on the importance of the area for prehistory. It may be summarised that : (1) he river terraces T_0 T_1 and T_2 consist of pebble beds found 5 m above the present level of water flow. (2) The surface of T_1 is made up of silty soil upon which cultivation is going on. (3) Vertical thickness of T_1 is 3 to 4 m. (4) There is considerable increase of pebble horizon towards T. Malangi (thickness varies from 0.5 m to 1.2 m). (5) paleaoliths were collected from to surface (oldest) (Fig. IV).

From the above observations it may be summarised that the river terraces (T_0, and T_1) were the open camp sites of palaeolithic man. The environment was fluvioeolian with humid and semiarid climate. Presence of kankar bands at Malangi, Talakad, Hemmige and Bettahalli areas indicate a dry warm climate followed by wet and humid condition.

Naravi (sl. no. 14) is a small, interior village named after the tributary stream *Naravi* that joins the Gurpur river. The scenario around Naravi is very picturesque and beautiful since it is surrounded by dense semi-evergreen forests. (Arora, 1967; pp. 15-24; Gupta, 1973; pp. 357-61 Fuziwara, 1984; pp. 3-14). The village is situated on the pediment slopes of the western ghats. The pediplains of Naravi are composed of laterites (ferricrete type), which are resistant to weathering (Duricrust) and out lay the landforms as mesas and butter. The rainfall of the area is 500 cms per annum.

Geologically the area consists of Dharwarian and Surgurian rocks. The major rock types are-granites, dolerite, felcite (igneous rocks) ; ironstones and quartzites (sedimentary rocks) ; and gneisses, schists, charackites (Metamorphic rocks). Exfoliated granitic domes stand out prominently from the low lying etched plains of laterites

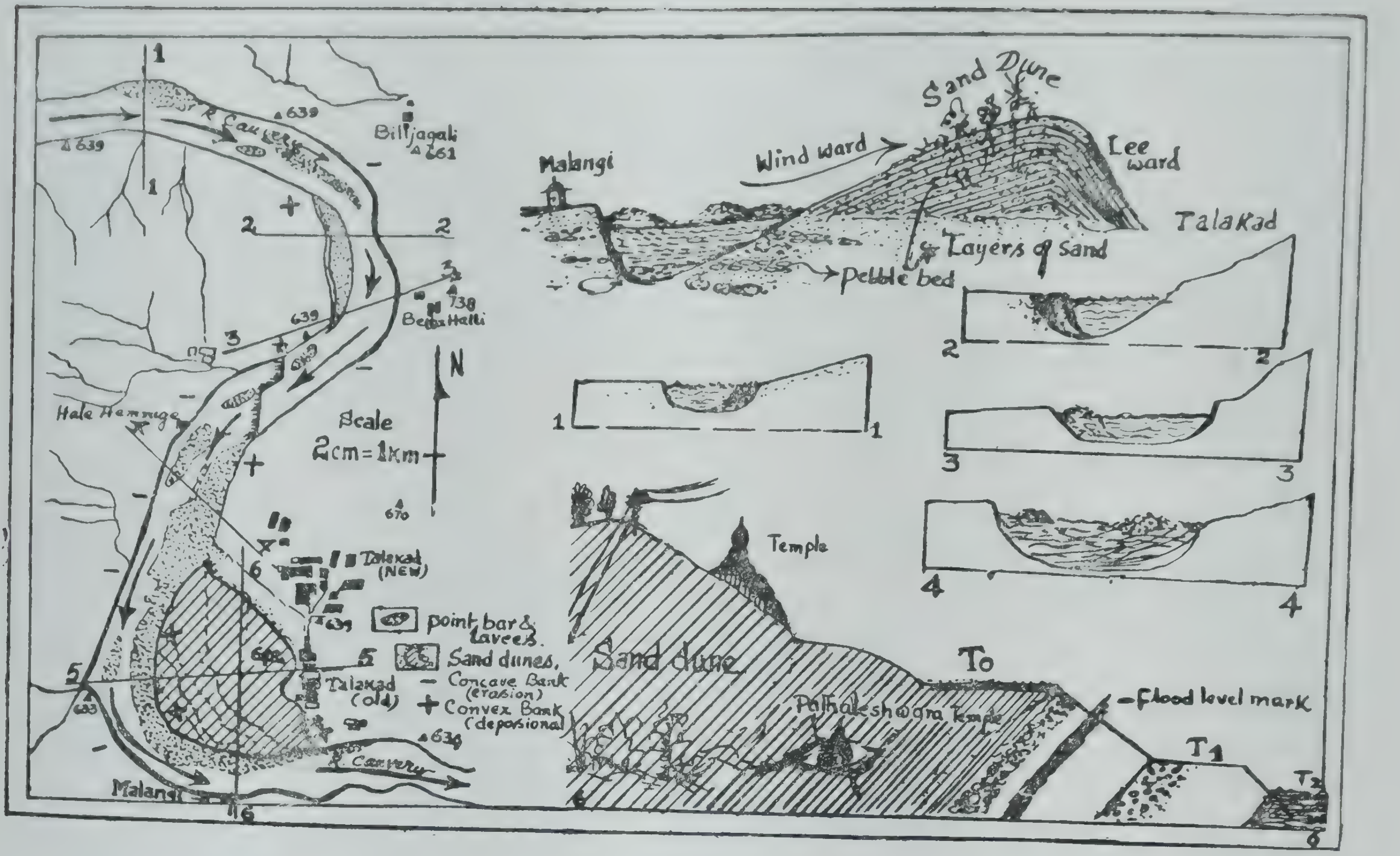

Fig. IV. Section-River terraces, Layers of sand

around Naravi (as seen at Nandilahill 870 m ; Karkal, Mudabidri, Venur and Belthangadi areas). These domes, inselberg, pedastal rock, and stocks are the off shoots of the Batholith. The above land forms have been carved out by weathering of 'Kanara granites' that granite has been dated 2681 ± 236 Ma years ; by Rd-Sr method (Balasubramanym *et al.* 1982; pp. 402–405).

The tributary stream Naravi originates on the Kuduremukh ridge (△1892 m) located 10 kms east of Naravi, and flows parallel to the contour 110 m along the north-western margin of this village. A deep youthful valley (10m deep), is there towards the pediment slope. There are altogether four river terraces (T_0, T_1, T_2, & T_3), with number of pebble beds seen in the vertical section. The floor of the valley (T_3) is composed of Kanara granites and migmatitic gneisses. These rocks are highly jointed, foliated and traversed by numerous dykes (dolerite and felcite) ; besides many aplite and pegmatite veins. The village Naravi is situated on the oldest lateritic terrace (T_0) and has lost the characteristics of the terrace owing to active cultivation, construction of houses and roads. It can be observed that a little of T_0 and a major portion of T_1 of this village has been irrigated.

Near the century old Forest Rest House of Naravi (on the oldest terrain T_0), the present author could find a lone piece of implement. Artefact is made up of dark greenish felcite. It measures 4 cms. in length and 3 cms in width. This is a levolloisian type of implement – borer cum scraper. Because of patination there is a slight change of colour from dark green to turbid green colour. Based on the similarity of the implement to those of Nevasian and Taminhal a middle palaeolithic age has been assigned.

Till recently the western ghats were considered as *terra incognita*, but the present find proves that further exploration of the promising, virgin areas of dense forest clad tracks of the Western ghats may bring forth more astonishing results as far as prehistory is concerned. The environmental reconstructions based on geomorphic profiles and the pollen analysis of the lithemarge (kaoline) consists of Carduoidae (2 sp.); Graminae (5 sp.); and *Rutaceae* (1 sp.). These species hint at the forest, fluviatile, humid and warm of the Savanna type climate (Shivarudrappa, Fuziwara and Sadakata, 1983; pp. 51-56).

Discussion

The term Quaternary was coined and used for the first time by Desnoyers (1829) after the type area of the Paris Basin. Since these deposits contained more than 70% molluscan species still living, the term pleistocene (i.e. most recent) was introduced by Charles Lyell (1839). Progress made during the last century in understanding the Quaternary period through glacial theory did not permit the use of the term *Glacial epoch* as the synonym, since this includes non-glacial deposits also (INQUA).

From the view point of stratigraphic and multidisciplinary work on Quaternary sediments of the world, there exists three important models, (Bowen, 1978; pp. 1–219). They are the Alpine (Penk and Bruckner 1909); East African (O' Brein, 1939); and Oceanic models (Emiliani and Shakeltor, 1974; pp. 511–514). According to Qaternary Stratigraphers, though the Alpine model (Gunz–Mindel-Riss-Wurm) has been deeply entrenched in the literature, it is inadequate and is yet to be stratigraphically defined. With regard to the East African Model (Oldvai Gorge) it has been suggested by many that this model is only the inferred climato-stratigraphic terms like pluvial and interpluvial, but not the true stratigraphic method that can be employed in correlation

(Flint, 1959; pp. 265 284; Bishop 1962). But the oceanic model is a classical one, since it is universal and can be precisely adopted in world wide correlation (Bowen, 1978; pp. 1–219). Thus the glacial and non-glacial deposits poses many problems of correlation due to imperfect events than the oceanic model.

During the last few decades the Quaternary of India has been studied exhaustively both by National and International teams of stratigraphers, Archaeologists and Geo-archaeologists. The three models discussed above also occur in India, of which the coastal terrain and the Himalayan parts show sequences of the marine and glacial models respectively. The hinterland shows mostly the fluviatile and lacustrine deposits (East African Model). Literature pertaining to the above categories has already been reviewd in this paper under section historical background.

In recent years the multidisciplinary approach has promoted great progress in Quaternary research; specially in the field of environmental reconstructions. Investigations by Butzer (1974; pp. 136-48 ; 76, 77, pp. 572–84; 82) and Fagan (1978) have shown that there is a synthesis and interrelationships between the environment and culture. Therefore our relationship to eco-system is determined by our culture. It is well known that the environment never remained static, so also the culture. Pioneering attempt has been made by Robert Bruce Foote (1863, 1901; pp. 1–131), while investigating the Attirampakkam, Vadamadurai and other sites of Madras, and Karnataka. He has expressed that the palaeoenvironment was not different from that of the present day ecosystem, besides opined that laterite in the above areas was younger than the palaeolithic culture. But, Krishnaswami (1938; pp. 58–90, 1947 ; pp. 11–49) expressed a contrary view that "This boulderbed (Vadamadurai boulder conglomerate) has brought to light for the first time the existence of Ancient Man even before the main laterite formation." This conclusion is an important milestone in the study of prehistoric man in the Indian peninsula.

Similarly a great wealth of information can be obtained on the coastal tracts of Kathiawar, Konkan and Gujarat, from the recent investigations of Rajaguru 1970, 85; Gudrun *et al.* 1972 ; Joshi *et al* 1975; Pappu and Marathe (1982; pp. 159–169 ; Joshi 1982), Rajaguru and Kale (1985 ; pp. 16–27). Whereas the coastal tract of adjoining the western ghats terrain cognita of Karnataka and the hinterland–Mysore plateau (southern part) have not been fully investigated as to their archaeological potentialities and palaeolithic environs. A beginning has been made in recent years.

From the detailed description of the 14 sites of Southern Karnataka, province, it is interesting to note the common feature that the artefacts are invariably found associated with the laterite debris (sl. nos. 1 to 10 and 14). Hence the laterites (ferricrete type) created the land forms for the optimal, dry surface and at high surfaces (on the Mysore plateau) which were the ideal places of open camping. Therefore Laterite surfaces were the gift of nature to the palaeolithic man. We know that the major changes of pleistocene in the tropical and subtropical areas (as in the Meditarranean region/Southern Karnataka province) were reflected in rainfall and change of temperature rather in the advancement of glaciers. Conclusions similar to this were put forth by de Terra and Paterson (1939; p. 354) and Burkitt (1963 reprint ; pp. 1-261), in his book entitled 'The Old Stone Age' –a study of palaeolithic time, observed that "Evidences resulting from the work in south and east Africa and elsewhere tends to show that the climatic changes which took place there in the form of alternating pluvial and dry periods corresponding to and were contemporary with glacial and interglacial alternations in the north". Similar picture may be obtained from the various sites of Southern Karnataka, once those areas that were under great pluviation, are now in semiarid regions (sl. no. 1 to 13).

Summary and Conclusion

From a field, laboratory, and environmental reconstructional studies made on the 14 sites of southern Karnataka province, the author would like to draw the following tentative conclusions :

1) There is a long tradition of collaboration in the field of *Geo-Archaeology* (coined and first used by Butzer in 1973) from the time of Robert Bruce Foote to present day.

2) There is a total lack of evidences regarding glacial activity in Karnataka besides the huminid fossils.

3) Saline earth (salt pans) and marshy places indicative of desiccation in the past (Sl. no. 1, 2, 8, 9).

4) Though numerable varieties of quartzites (Fuchcite, Quartzite, Ferrugenous quartzites, Magnetite quartzits etc.) are available in the investigated areas, only pale pink quartzite was selected by the palaeolithic man for the manufacture of artefacts. Hence this variety may form a Marker horizon to locate the industries.

5) The regional distribution of the sites in the study area show that there is a linear distribution (longitude 75° and 76°) and some are closely interspaced (5 to 10 kms) like those of Nidighatta–Lingada Halli, Janakal Talya ; Kibbanahalli—Biligere. From the existing date, i. e. out of 14 sites 10 are nearer to the perennial rivers ; (fluviatile), but 2 of them show Fluvio-colian (Nyamathi–Talakad) Dunes in the Tungabhadra Command area 10 m high. 8 kms in length by $\frac{1}{2}$ km wide (Subash Chandra and Ganachari, 1984). Dunes in the Cauvery course (Talakad). 16 m. high ; cover 10 sq. kms. $1\frac{1}{2}$km. wide.

6) Inland areas (sl. no. 7, 8, 9 and 12) that are away from the fluviatile environment, might have enjoyed Lacustrine environment with or without springs.

7) Three layers of gravel beds (with implements) at Kibbanahalli is indicative of extended, successive settlements at different periods.

8) Exfoliated granitic domes along with the laterite mesas and butts (as at sl. no. 1, 2, 4, 5, 6, 8, 9 and 14) have provided dry grounds, defensibility, and the low flood, risk for the palaeolithic man.

9) Forests (sholas), springs, lakes, and the Savanna type grasslands show a mode of hunting-gathering.

10) Contemplated geo-chemical and palynological studies of the palaeosols may interpret the microenvironments of these sites.

11) Clamato stratigraphy and morphostratigraphy of the type areas have to be worked out along with C_{14} dates to establish chronology.

12) Optimal surface for the open camps of the palaeolithic man might have been 930 m and 950 m. in the Southern Karnntaka region.

13) Intensive study of older alluvium (subsurface) may provide a clear a

clear picture of the environment and depositional history.

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EXPLANATORY NOTES FOR THE SYMBOLS USED IN THE TABLE 1

RBF — Robert Bruce Foote ; MS— M. Seshadri ; EWW—E.W. Wetherel ;
PS— P. Sampat Iyengar ; LR— L. Rama Rao.
KSP — K. Sreepada Rao ; BKG— B.K. Gururaja Rao ; TVS— T.V. Shivarudrappa ;
KG— Kenzo Fuziwara ; NS— N. Sadakata ;
SN — S. Nagaraju ; KBS— K.B. Sadananda.
MGM— Madras Government Museum ; CCB— Central College, Bangalore, Geology Department ; AHA— Ancient History and Archaeology, Manasagangotri, Mysore ; DAM— Directorate of Archaeology & Museums, Government of Karnataka, Palace Complex, Mysore ; LP— Lower Palaeolithic ; MP— Middle Palaeolithic.
* Case Study Areas. **Environments attributed by the author.

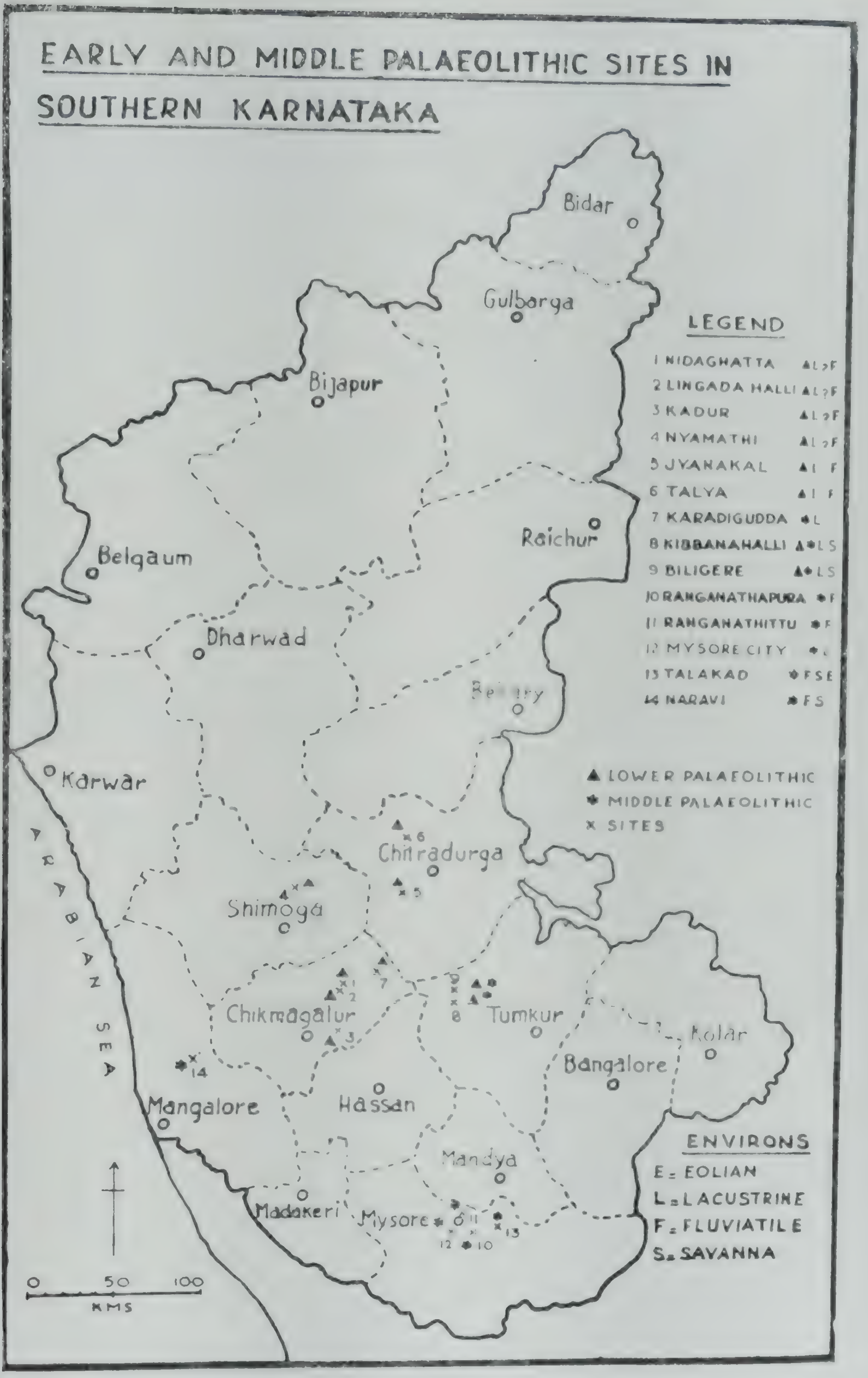
EARLY AND MIDDLE PALAEOLITHIC SITES IN SOUTHERN KARNATAKA
Bidar
Gulbarga
Bijapur
Belgaum
Raichur
Dharwad
Bellary
Karwar
ARABIAN SEA
Chitradurga
Shimoga
Chikmagalur
Tumkur
Kolar
Bangalore
Hassan
Mangalore
Mandya
Madikeri
Mysore
0 50 100
KMS
LEGEND
1 NIDAGHATTA ▲L ?F
2 LINGADA HALLI ▲L ?F
3 KADUR ▲L ?F
4 NYAMATHI ▲L ?F
5 JYANAKAL ▲L F
6 TALYA ▲L F
7 KARADIGUDDA ✱L
8 KIBBANAHALLI ▲✱L S
9 BILIGERE ▲✱L S
10 RANGANATHAPURA ✱F
11 RANGANATHITTU ✱F
12 MYSORE CITY ✱L
13 TALAKAD ✱F S E
14 NARAVI ✱F S
▲ LOWER PALAEOLITHIC
✱ MIDDLE PALAEOLITHIC
× SITES
ENVIRONS
E = EOLIAN
L = LACUSTRINE
F = FLUVIATILE
S = SAVANNA

Fig. 1

TABLE 1 : EARLY AND MIDDLE PALAEOLITHIC SITES OF SOUTHERN KARNATAKA

Sl. No.	Reported from	Topo sheet No	Longitude Latitude	District Taluk	Reported by	Year of report	No. of (Implements & dimension	Material of implement	Associated with	River system	Repository of Material	Settlement pattern & environment	Industry
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Nidaghatta (Nidagatta)	57 C/3	76°2'45" 13°24'0"	Chick-magalur (Sakrepatna taluk)	RBF	1881	(3) 9–8 7–6, 7-6	Pebbles	Laterite. debris	Vedavathi	MGM	Lacustrine ? fluviatile	LP
2	Lingada halli	57 C/3	76°1'30" 13°22'0"	Chick-magalur (Sakrepatna taluk)	RBF	1901	Many(13) 8–6 8–6.5 6.5–6	Quartzite	Laterite debris	Vedavathi	MGM	Lacustrine? fluviatile	LP
3	Kadur	57 C/2	76°1'25" 13°3'30"	Chick-magalur	RBF	1884	(3)	Quartzite	Shingle bed	—	MGM	Streams	LP
4	Nyamathi (Nyamati)	48 N/12	76°34'30" 14°09'20"	Shimoga (Honnali taluk)	RBF	1901	(2) 7–8	Pebble tool (bifacial) quartzite	Pale Quartzite single	Tungabhadra left bank	MGM	Lacustrine? fluviatile	LP

1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	Jyanakal (Janakal)	57 C/5	76°19'30', 13°45'30"	Chitradurga (Holalkere taluk)	RBF	1901	(2) 7-6 9-6	Pebble tool Quartzite	Lateritic debris	Vedavathi	MGM	Lacustrine? fluviatile	LP
6	Talya	57 B/8	76°16'30" 14°2'20"	Chitradurga (Holalkere taluk)	RBF	1901	(3) 9-6 11-8.5 8.5-6	Quartzite	Lateritic debris	Vedavathi.	MGM	Lacustrine ? fluviatile	LP
7	Karadigudda	57 C/7	76°19'30" 13°29'10"	Hassan	MS	1956	(1)or(2) 8-5.5	White vein quartz	Laterite debris	—	DAM	Lacustrine	
8	Kibbanahalli*	57 C/11	76°38'10" 13°18'10"	Tumkur (Tiptur taluk)	EWW PS/LR MS TVS/ BKG	1901 1924 1956 1985	Many	Quartzite	Laterite soil shingle	—	CCB Geology Dept. DAM AHA	Open camp site* Lacustrine Savanna Warm and Wet	LP & MP LP & MP
9	Biligere*	57 CU/11	76°37'05" 13°18'10"	Tumkur (Tiptur taluk)	PS/ LR MI TVS/ BKG	1924 1956 1985	Many	Quartzite	Laterite Shingle		CCB. Geology. Dept. DAM AHA	Open camp site** Lacustrine Savanna Warm & wet.	LP

1	2	3	4	5	6	7	8	9	10	11	12	13	14
10	Rangana thapura*	57 D/15	76°50′0″ 12°19′0″	Mandya (Bannur taluk)	RBF KSR TVS/ BKG	1901 1930 1985	(1) 9-7	Quartz	Alluvium	Cauvery.	CCB. Geology. Dept.	Fluviatile**	LP & MP
11	Rangana-thittu*	57 D/11	76°39′30″ 12°25′30″	Mandya (Sreeran–gapatna taluk)	SN KBS TVS	1975	Many	Felsite	Alluvium.	Cau–very.	AHA	Open camp** Fluvia–tile.	MP
12	Mysore City*	57 D/11	76°36′20″ 12°17′25″ 76°37′30″ 12°18′25″	Mysore City	TVS	BKG 1985	(3)	Chalcedony Felsite	Weathered Kankur	Tain Gullies	AHA	Open Camp** Fluviatile	MP
13	Talkad*	57 H/4	77°01′0″ 12°11′0″	Mysore (T. Narasipura Taluk)	TVS	BKG 1985	Many	Quartz pebbles	Flood plain allu–vium.	Cauvery	AHA	Open camp** Fluvio Eoline wet and dry Dune environment.	MP
14	Naravi*	48 O/3	75°09′0″ 13°07′0″	South Kanara (Belthan-gadi)	TVS NS	KF 1985	(1)	Felsite	River terrace Laterite Alluvium	Naravi	AHA	Fluvial Savanna Humid warm	MP

6. MIDDLE AND UPPER PALAEOLITHIC IN KARNATAKA-ANDHRA

M. L. K. Murty

INTRODUCTION

The Karnataka-Andhra region is rich in Stone Age sites and the beginnings of prehistoric research dates back to the times of Robert Bruce Foote, who in the last quarter of the nineteenth century (Foote 1876) made a collection of Palaeoliths and Neoliths during his geological investigations in the Southern Maratha country (the northern portion of the present Karnataka State). Subsequently Foote (1916) catalogued several Stone Age sites, and Cammiade and Burkitt (1930; pp. 327-39) by their pioneering research on the southeast coast presented a four-fold sequence of lithic industries, which they designated as Series I—IV (synonymous with the Lower, Middle and Upper Palaeolithic and Mesolithic, respectively), in a stratigraphical and palaeoclimatological context. Work by later scholars in Karnataka-Andhra highlighted, on the one hand, the nature of lithic technocomplexes, site distribution pattern and possible modes of human adaptations during the Palaeolithic and Mesolithic periods, and on the other the emergence of village settlements based on an agro-pastoral economy (for details and bibliography see Sankalia 1974). These investigations have proved that the Karnataka-Andhra region is a key zone in the peninsular interior for the reconstructions of Stone Age sequence, the explication of man-land relationships and the explanation of the processes of cultural change from a hunting-gathering way of life to the emergence of village economy. This paper, as the title indicates, centers on an evaluation of the Middle and Upper Palaeolithic of this region.

The Region

Excepting the narrow western coastal strip where the Western Ghats raise steeply from the Arabian Sea, and the Eastern littoral marked by a chain of hill ranges popularly known as the Eastern Ghats, the Karnataka-Andhra region—the eastern half of Karnataka and the western half of Andhra-is an upland plateaux country (for details on geology, and physiography see Spate *et al.* 1972).

The northern part of Karnataka and the northwestern part of Andhra (the latter forming a part of the Telangana), in fact, are the extensions of the Maharashtra plateaux. Though there are extensions of the Deccan lavas, this part basically comprises pre-Cambrian gneisses and schists. It is drained by the Godavari and its tributaries, the Bhima, and the Krishna and its two tributaries: the Ghatapraba and the Malaprabha. The topography of this region is characterized by rounded hills, rolling plains, broad open valleys (excepting the Godavari gorge), and inselbergs and tors which especially form a conspicuous feature of the Telagana landscape.

The middle part of Karnataka, which forms the Mysore plateaux (with an elevation of 600 m above sea level) and drained by the Tungabhadra river system is divided into *Malnad* and *Maidan*. The *Malnad* is a hilly country dissected into deep valleys and covered by dense forests. The *Maidan*, on the other hand, is again a country of rolling plains with low granitic hills. The Rayalaseema of Andhra which has the same topography merges into the *Maidan*. Further east of the Telangana and Mysore Plateaux is the country of the Eastern Ghats and the eastern littoral. The Eastern Ghats appear as uplifted plateaux abruptly demarcated from the surrounding plains. They run in fragmentary spurs and ranges, in a crescentic form south to north leaving broad plains between them and the Coromandel coast. These Eastern

Ghats, more aptly described as Eastern Hills by Spate (1972) have many ranges south of the Krishna. These are the Nallamala, Yerramala, Palkonda, Volikonda, Sechachalam and Nagari. This is a rugged and broken hilly country with jagged peaks and steep slopes. The major rivers that form the drainage system of this area the Krishna, Tungabhadra and the Pennar; the others are the Paleru, Kunderu, Cheyyeru, Gundlakamma, the Gunjana and the Swaranamukhi. This country, further southeast, merges into the Tamilnad plains.

The Karnataka–Andhra region, in other words, is essentially an upland rolling plateaux drained by easterly flowing shallow streams and rivers, without much alluvium on the banks. It presents an erosional landscape and has preserved erosional surfaces (peneplains) ranging in age from the Mesozoic to the Pleistocene. In so far as the rock formations are concerned, this area is dominated by the pre–Cambrian complex–gneisses, granites, schists, quartzites, conglomerates, greenstones (epidorite), limestones, shales, slates, etc. All these formations are extensively traversed by dolorite dykes, quartz veins, and fine grained rocks like chert and jasper occur as siliceous pockets in limestone, or as veins and sills, and also conglomeratic beds. The pre–Cambrian complex also presents intricate geological structures such as folds and faults.

The vegetation along the flanks of Western Ghats (2000–1500mm rainfall) is the moist deciduous type of the *Tectona–Lagerstroemia–Terminalia* series. The Karnataka-Andhra upland plateaux and hilly ranges of the Eastern Ghats present different types floristic series. These are : *(1) Anogeissus-Chloroxylon-Albizzia amara ; (2) Albizzia amara plus Acacia and Anogeissus ; (3) Anogeissus-Terminalia-Tectona ;* and *(4) Hardwickia-Pterocarpus Anogeissus.* The floristic landscapes are deciduous woodlands on the hilly ranges which degrade into Savanna woodlands, degraded Savannas, scrub woodlands and thorny thicket zones (Caussen *et al.* 1964, 1965). The soils are red and black loams and ferruginous tropical soils.

The Middle Palaeolithic

Sankalia's work at Nevasa on the river Pravara (Maharashtra) was mainly responsible for identifying the stratigraphical and typotechnological parameters of the post–Acheulian flake tool assemblages which were variously labelled as Series II, Nevasian and Middle Stone Age (Sankalia, 1956; pp. 35–52 1964; pp. 365–75). These are now designated as the Indian Middle Palaeolithic. Banerjee (1957) evaluated the flake tool assemblages at Anagwadi, Bagalkot and Herkal (on the Ghataprabha), Alimatti and Sitamani (on the Krishna) and Badami and Taminhal (on the Malaprabha) compared them with the Nevasa assemblage, and designated these as the Karnataka Nevasian. Barring the discovery of several sites reported in the annual numbers of the *Indian Archaeology—A Review*, the investigations of Paddayya (1974 ; pp. 1–19) and Pappu (1974) made a valuable contribution on the Karnataka Middle Palaeolithic. In the Andhra region, the extensive explorations of Isaac (1960) in the Kurnool river systems confirmed the earlier findings of Cammiade and Burkitt (1930; pp. 327–39) and the investigations that followed, in different districts—Nalgonda (Rao, 1966), Prakasam (Madhusudana Rao, 1979), Nellore (Sudersan, 1979), Cuddapah (Thimma Reddy, 1968), Chittor (Murty, 1966), and Adilabad, Karimnagar and Warangal (Singh, 1984; pp. 7–29) disclosed the extent of the Middle Palaeolithic, and its salient features, in Andhra Pradesh.

The Salient Features of the Middle Palaeolithic

A greater part of this region is a Savannah woodland, Savannah and thorny thicket country ; and the Middle Palaeolithic surfacial occurrences have their distribution within the riverine ecotones of the major and minor rivers and their tributaries. Artifacts of this technocomplex are predominantly made of flakes obtained by direct percussion, prepared core and discoid core techniques. The chief tool types are scrapers, points and borers. Scrapers are by far the prepondarant type and include different forms such as straight, concave, convex, transverse, end, round and steep. The points comprise simple flake points, a few bifacial points, tanged points and shouldered points, but they lack symmetry and display crude appearance. Borers are well finished; they also occur as combination tools such as scraper-borers, borer-cum-points etc. Burins, denticulates, and tools made of nodules occur occasionally. The debitage includes primary flakes, dressing flakes and cores. The chief raw materials are chert, jasper and chalcedony, and quartzite at some sites. The evidence recorded in the Hunsgi valley (Paddayya, 1974; pp. 1–19), Ghataprabha Valley (Pappu, 1974) and the middle Godavari valley (Singh, 1984; pp. 7–29) is by far the best for an understanding of this technocomplex.

In the Hunsgi valley of the Shorapur Doab there are both workshop sites and gravel occurrences (Paddayya 1974; pp.1–19, 1984; pp. 345–403). About nine sites yielded 1928 artifacts, of which the finished tools amount to 17%. Among the finished tools side and transverse scrapers with different forms of working edge (75.98%), followed by tanged and bifacial points (11.56%) and combination tools (2.75%).

In the Krishna-Ghataprabha system (the Kaladgi region) are known about twelve sites. Of all these, Kovalli, situated on the left bank of the Ghataprabha has yielded the best evidence (Pappu, 1974). It is an extensive open-air factory site and yielded a total 2429 artifacts, chiefly made on chert. The regular tool types constitute 7.51%, flakes 19.49%, cores 10.91% and waste products 62.09%. The regular tool types comprise scrapers (end, side, hollow, round and indeterminate) which amount to 79.00%, points (12.00%), borers (6.00%), scraper-cum-borers (2.50%) and miscellaneous (0.50%). Among the regular tool types those made on flake represent 84.20% and the remaining 15.80% are made on core.

Numerous Middle Palaeolithic sites were brought to light in the Godavari–Penaganga valleys from Basar (Adilabad district) to Bhadrachalam, Khammam district, (Singh, 1984; pp. 7–29). The sites are dispersed both in the north and south of the Godavari and are situated away from the river banks, but in close proximity to a water source. Excluding the secondary river gravel sites, there are extensive habitation sites and also workshop sites. At almost all the sites in the Adilabad district, chert and chalcedony are the chief raw materials, whereas in the other districts quartzite is dominant. The tools are chiefly made on flakes and comprise scrapers, borers, points (which include a few unifacial and bifacial varieties); and small handaxes also occur. And these sites are situated in deciduous woodlands and thorny thicket zones. The most interesting aspect of Singh's work is the discovery of animal fossils in undisputable association with the Middle Palaeolithic at least at eight sites. These fossils belong to ox *(Bosnamadicus)*, buffalo (*Babalus* sp.) horse (*Equus* sp.), pig (*Sus scofa cristatus*) deer (*Cervus* sp.) and antelope (*Boselaphus* sp.). At Khazipalli site occur intentionally broken long bones and jaw bones of most ofthe above mentioned species and also dermal scutes of

Chelonia sp. at the Middle Palaeolithic occupation. What is more a molar of elephant (*Elephas* sp.) has also been found at Asifabad (Adilabad district) on the Tirani river. The most valuable discoveries made by Singh are at Wankdi and Selibaka, both in Adilabad district. These two sites are located in a valley surrounded by trap hills, criss crossed by several feeders which have perennial springs, and the vegetation cover, as of today, is a degraded woodland. These are extensive occupation scatters on terrace flats and foot hills. At Wankdi site, near the Nirmal Ghat, are circular (1.5m in diameter) and rectangular (2m x 1.5m) structures, seven in all, made of loosely piled up rocks. These occur in an area of 20m x 10m. Singh rightly believes that these are man made platforms and suggests the possibility that they might belong to the Middle Palaeolithic. The two rubble floors (1.5 m x 1.5m) found by Singh at Selibaka, on the other hand, are associated with the Middle Palaeolithic artifacts.

Technocomplex of the Eastern Ghats and the Andhra Littoral

The density of sites and the relative abundance of artifactual content at different sites of primary/semi-primary nature in the Gundlakamma, Pennar, Tungabhadra, Cheyyeru, Rallakava, Swarnamukhi and Gunjana point out that this region was thickly populated (compared to the Karnataka-Andhra Uplands) during the Middle Palaeolithic (for that matter right from the Acheulian times). Physiographically these sites are concentrated along the hilly flanks within the drainage limits of minor tributaries, hill streams and their feeders. The distribution of sites along the small tributaries of the Krishna, i.e., Aler, Musi, Halia, Peddavagu and Dindi (Rao 1966), though falling in the Telangana upland plateau, indicate a similar settlement system in a savannah country. It is the same pattern in the Bhavanasi, Tigaleru and Sagileru river systems of Kurnool district (Isaac 1960.)

The sites along the eastern flanks of the Eastern Ghats, from the Gundlakamma river and further south--Paleru, Pennar, Cheyyeru, Rallakava, Gunjana and Swarnamuhki basins represent a distinct technocomplex (see : Madhusudana Rao 1979, Sudersen 1979, Timma Reddy 1968, Raju 1981, Murty 1966, Jaya Raj 1983). The characteristic features are : (1) predominant use of medium to fine grained quartzite; (2) greater variability in the scraper tool component (eg., bifacially and unifacially worked discoid scrapers, and steep scrapers are common) ; and (3) persistence of Late Acheulian traditions with further technological perfection, as can be seen in the miniature handaxes, cleavers and bifacial points, at most of these sites. This technocomplex of the eastern littoral, south of the Krishna, betrays affinities to the Mousterian of Acheulian tradition. The assemblages at sites in the Krishna and Tungabhadra systems (Rao 1966, Isaac 1960) fall in between, in that the Mousteroid traits of Karnataka-Andhra upland country make a strong imprint with a minor combination of the Andhra littoral artifact styles.

The Upper Palaeolithic

One of the best evidences for the Upper Palaeolithic in the Indian subcontinent has come to light from this region (Murty, 1979; pp. 301-20 ; Padayya, 1984 ; pp. 345-403). And again two distinctive lithic technocomplexes, as in the case of the Middle Palaeolithic, are striking in their distribution.

Technocomplex of the Karnataka-Andhra Uplands

This can be generalized as a blade tool complex. Assemblages of this technocomplex constitute large to small sized blades ; backed blade tools ; and scrapers, points, awls and burins on flake, flake-blade and blade. The best evidence in Karnataka is known from Bijapur and Gulbarga districts, at the sites of Salvadgi, Meralbhavi, Gulbal, Benhatti and Hunsgi (Paddayya, 1970 ; pp. 165–90). Salvadgi, Meralbhavi, are factory-sites located on chert veins occurring in limestone formations. The artifact types from this site comprise : finished tools : retouched blade tools (51.52%), backed blades (3.84%), burins (8.39%), simple points (14.12%), tanged points (2.29%), borers (6.11%), misc. types (13.73%); and simple artifacts : blades (62.02%) blade sections (15.89%), core flakes (6.91%) core rejuvenation flakes (3.16%), fluted cores (9.48%), flakes (0.53%) and rejects (1.61%). Assemblages of this technocomplex, i. e., consisting of a predominant blade element, retouched tools like scrapers on flake, flake blade and blade, and misc. forms, and marked the meagre representation of backed blade element, are known from Yadwad in Belgaum district, Karnataka ; open-air findspots and a cave site known as Muchchatla Chintamanu Gavi at Betamcherla, Kurnool district, Andhra Pradesh (Murty and Thimma Reedy, 1970 ; pp. 106-28, Murty, 1974 ; pp. 196–230) and Vemula, Cuddapah district, Andhra Pradesh (Timma Reddy, 1970 ; pp. 227-54) ; and at least 15 sites in the Godavari valley (Adilabad district, Andhra Pradesh), the most important being Wankdi, Kusli, Manikgudem, Pochera waterfalls, Devaragutta, Rallapet, Nirmal and Kermeri (Singh, 1984 ; pp. 7–20). The raw materials that were used are predominantly of cryptocrystalline family like chert, jasper and chalcedony, and quartzite at some sites (eg. Vemula and Rallapeta).

Technocomplex of the Eastern Ghats and the Andhra Littoral

Unlike in the Karnataka–Andhra uplands, sites in the intermontane basins of the Eastern Ghats and hinterland riverine ecosystems of the Andhra littoral are far more numerous. What is more, the artifactual content, as best attested at Renigunta (Murty, 1970 ; pp. 106–28) and Rachapalli (Raju, 1981) run into several thousands pointing out a definite demographic density in this region. The recent discovery of thirteen new Upper Palaeolithic sites in Cheyyeru basin (Raju ; personal communication), where again the occupations in extant range from four hectares to one hectare, and the artifactual yield amounting into several thousands, confirms the above mentioned pattern. There newly discovered sites in the Cheyyeru basin such as Kutalamarri, Mallemadugu, Marlabailu, Peddayapalli and Palamanirevu (Cuddapah district, Andhra Pradesh) occur as extensive occupation scatters in the deciduous forested ecotones of the Velikonda range at altitudes ranging from 900 m to 600 m. The sites in the Rallakalava and Gunjana valleys occur at 300 m to 150 m elevations from the sea level.

The chief attributes of this technocomplex are : (1) a highly standardized blade tool technology ; (2) predominance of backed blade elements ; (3) typical burins at some sites (eg. Renigunta) ; (4) a variety of scrapers made of blade (end, side, convex, concave, straight) and others as well on flake and core like steep and round scrapers ; (5) occurrence of occasional choppers ; and (6) fine grained quartzite and lydianite being the chief raw materials. The artifact inventory at Renigunta can be cited as an illustration for this technocomplex. At Renigunta, the finished forms (13.20% of the total collection) comprise choppers (3.20% among the finished forms), backed blade variants (67.30%), awls (3.70%), and points (2.00%). Blades make up 19.30% while the other categories represent 67.50%, in the total collection. Artifacts of the latter constitue primary flakes (2.65% among the other categories), flakes (5.45%), core flakes (9.57%), cores (4.70%) and chips (59.20%). At most of these sites, also occur, grindstones and, slabs bored stones. Some of these bored stones, those made of flat nodules and not as heavy as to be regarded as weights for digging sticks, must have been used as net sinkers. Another important feature worth noting is the occurrence of large sized backed blades, some being as big as orange segments. These, interestingly enough, recall the Australian elouera. It should also be noted that the horsehoof cores occurring at some sites are again reminiscent of the Australian counterparts.

Bone Tool Assemblages

The Kurnool cave sites are the only ones known to date for the bone artifacts found with a lithic blade tool complex and in association with the Late Pleistocene fauna. Robert Bruce Foote and his son Henry Bruce Foote excavated the Billa Surgum caves at Betamcherla in the later part of the last century and recovered bone implements and Late Pleistocone fauna (Foote, 1885 ; pp. 227–35; Lydekker, 1886 ; pp. 23–58). These implements (200 out of 1700 specimens) comprised awls, barbed and unbarbed arrowheads, daggers, scraper-knives, scrapers, chisels, gouge, wedges, axes heads and sockets. Foote compared some of the bone implements to the Magdalenian of France. Recent excavations at Muchchatla Chintamanu Gavi have not only confirmed the findings of Footes, but have also yielded lithic blade artifacts in association with bone tools and Late Pleistocene fauna (Murty, 1974 ; pp. 196-230, 1975 ; pp. 132-38).

Chronology

On relative chronological grounds and in the light of a few radiocarbon dates from Maharashtra (see Paddayya, 1984; pp. 345–403; 358), the Middle Palaeolithic in the region under discussion can be ascribed to Upper Pleistocene falling in the time range of 40,000 B.P. to 30,000 B.P.

In the light of a thermoluminescence date (17,390 ± 10% B. P.) from an Upper Palaeolithic fireplace at Muchchatla Chintamanu Gavi, and a few radiocarbon dates known from other Upper Palaeolithic sites in the country (see Nambi and Murty, 1983; pp. 110–116), the Upper Palaeolithic of Karnataka–Andhra can be ascribed to 30,000 B. P. to 10,000 B.P.

Subsistence Strategies

Some generalizations can be made on the subsistence strategies considering the functional attributes of the artifacts. Both the Middle Palaeolithic technocomplexes are amorphous in nature, and the most dominant tool type is the scraper. These scraper variants like side, straight, end, concave, notch, and convex; and other forms like borers, crudely retouched flakes and nodules, and large utilized flakes, in all certainty can be associated with wood and bamboo/ and bone work; in making hunting aids like wooden spears, bow and arrow, thrusting spears, and foraging aids like the digging sticks. It can be postulated that some of of the symmetrical unifacial and bifacial points, and Lavallois flakes could possibly have been mounted as arrow tips. The faunal remains found in association with the Middle Palaeolithic in the Godavari valley sites (Singh, 1984; pp. 7–29) reveal not only the kind of game that was hunted but also the nature of adaptations in the deciduous woodland ecosystems ? From the upper Palaeolithic times, the advent of blade tool technology must have facilitated the manufatcure of composite tools (harpoons for hunting and fishing) and specialized hunting aids such as nets traps (which involve considerable cord work), and spring traps, gravity traps and snares (which need wood and bamboo accessories). The faunal remains from the Kurnool caves indicate that these groups were able to hunt the game like ox (*Bos* sp.), buffalo (*Bubalus* sp.), niligai (*Boselaphus tragocamelus*), blackbuck *(Antilope cervicapra)*, chinkara *(Gazella gazella bennetti)*, four-horned antelope *(Tetracerus quadricornis)*, sambar *(Cervus unicolor)*, chital *(Axis axis)*, barking deer (*Muntiacus muntjak)*, mouse deer *(Tragulus meminna)*, wild boar *(Sus scrofa cristatus)* and *Sus kurnuliensis* (new fossil species, Lydekker, 1886; pp. 23-58), black naped hare *(Lepus nigricollis)*, porcupine (*Hystrix crassidens;* new fossin species, Lydekker, 1886; pp. 23-58), pangolin *(Manis giga ntea)*, monitor lizard *(Varanus draceena)*, turtle *(Chelonia* sp.*)* and *crocodile* (Crocodilus sp.). The agile game represented in the above mentioned species could not have fallen a prey without the use of specilized hunting aids.

If the exploitative strategies of the traditional ethnics inhabiting these regions are any guide, it can be hypothesized that the subsistence strategies from the Middle Palaeolithic times onwards could have been geared to the exploitation of big and small game, avifauna, aquatic fauna, insects and honey. There could have been an equal emphasis on the exploitation of a variety of wild plant foods such as leaf foods, yams, fruits, berries, flowers, nuts and seeds (see Murty, 1985 ; 329-336).

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7. THE MESOLITHIC CULTURE OF KARNATAKA, KERALA AND TAMILNADU AN APPRAISAL

P. Rajendran

INTRODUCTION

Most of the important pre-historic discoveries in this country had taken place initially in South India, and a few out of them include the Megalithic burials from Chirakkal taluk of Cannanore district in north Kerala (Babington, 1823; pp. 324-30), the first stone tool — a ground or polished axe — from Lingsugur in Raichur district of north Karnataka (Medows Taylor, 1842), the Palaeolithic implements from Pallavaram in Madras (Foote, 1916), the Neolithic tool from the foot of Kannyakod hill in north Kerala (Philip Lake 1891; pp. 221-37), and a few quartz flake along with a fragment of a Neolithic celt from Wynad area (Fawcett, 1901; pp. 409-22).

Dr. Primrose's discovery of a bagful of stone-knives and arrow-heads from Raichur district in 1842 (Allchin *et al*. 1968) probably might be the first Mesolithic findings from Karnataka, if not from the whole country. Robert Bruce Foote's Stone Age discovery from Karnataka goes back to 1881 when he picked up the Palaeoliths from Kadur in Mysore. Since then he had discovered several prehistoric evidences from various parts of Karnataka and they were included the Mesolithic of the region among other cultural phases. Following his discoveries sporadic occurrences of stone implements probably of the Mesolithic and post-Mesolithic were reported from French rocks near Seringapatam, Hiriyur in Chitradrug dist., Kaldurgahill in the Tarikere taluk, Holakal Hill in the Sirsi taluk, race course at Bangalore, Minakshyyas estate on the south east of Tumkur and at Siddapura and Jetingarameshwara in the neighbourhood of Brahmagiri.

There was, however, a lull in the prehistoric research in South India about three decades, especially in Karnataka, after the initial discoveries, and the monotone was broken when Cammiade and Burkitt (1930; pp. 327-39) took up the work in various parts of the south-east coast of India. The discoveries made by Gordon (1945; pp. 28-30) around Bangalore, Todd (1948) from Jalahalli, Subbarao (1948) from Sanganakallu, Allchin (1952; pp. 268-271) from Kibbanahalli and the studies conducted by Seshadri (1956) had revealed the general characteristics of the Mesolithic industries in Karnataka.

Even though investigations were carried out on the pleistocene geomorphology and prehistory of Malaprabha (Joshi, 1955), Ghataprabha (Pappu, 1974), and Middle Krishna (Korisetter, 1979) all in the Krishna basin in north Karnataka no progress seems to have been made in unravelling the Mesolithic culture of the region except the stray evidences of the Mesolithic implements discovered by R. S. Pappu from a few caves around Badami. Pre-historic investigations in the Amarja valley in Gulbarga district, however, had yielded Mesolithic industries from several places(Nagaraju, 1971; pp. 218-223). Studies conducted in the Shorapur Doab have given a new impetous for the prehistoric investigations in the region which have resulted in the discoveries of a number of Stone Age sites (Paddayya, 1968, 1970; 165-190), (1970; pp. 71-78), (1974; pp. 590-607). Even though more Mesolithic evidences have been obtained from various parts of north Karnataka not much have been found from the southern region of the State. Above all, till recently coastal Karnataka had remained a total blank in the case of Stone Age evidence.

South India, especially its coastal region, has been previously little considered in prehistoric studies. Except for a few sites in the Tinnevelli district of South Tamil Nadu and a solitary site at Chevayur near Calicut in north Kerala, no Mesolithic industries were known until recently. The prehistoric investigations since 1974 in various parts of Kerala have, by this time, yielded rich Stone Age cultural evidences which include the Lower Palaeolithic and the Mesolithic industries from various physiographical situations (Rajendran, 1975; pp. 125–26), (77; pp. 497–502), (79 ; pp. 263–70), (82 ; pp. 263–270) (82 ; pp. 637-40), (83; pp. 133-37), 83; pp. 25-29) (83; pp. 18-31), (85; pp. 165–70), and 1985 p. 203). The Mesolithic industries have been found in well stratified context as well as surface finds, and the rock engravings as incisions probably of the same culture have also been recorded in the rock-shelter of Tenmalai. The wood charcoal obtained along with the Mesolithic implements from the excavations of 35 cm. deep trenches T_1, T_2 and T_3 in the rock-shelter have been dated by C^{14} in the Birbal Sahni Institute of Palaeobotany, Lucknow to 5120 ± 120 (BS-525), 5210 ± 110 B.P. (BS-630) and 4420 ± 110 B.P. (BS-646) respectively, which indicate a Late Mesolithic habitation at the site (Rajendran, 1985 p. 203). Thampi (1983) has also reported a few Mesolithic sites from Marayur in Iduki district of Kerala.

As a sequel to the above work pre-historic and palaeo-environmental investigations were conducted on the south-east coast of Tamil Nadu which led to the discovery of more Mesolithic sites in the coastal regions of Tinnevelli district, besides understanding the possible cultural chronology, and the palaeo-environmental phases in the region during the terminal Pleistocene. (Rajendran; 1979). Mesolithic sites in Tinnevelli district of Tamil Nadu were first discovered by Foote (1916), and were later studied by Krishnaswami (1938 ; pp. 58–90), Aiyappan (1945; pp. 145-54) and Zeuner and Allchin (1956 pp. 4-20). Similar evidences were also obtained from Kuruviakondanapattai in Pudukkottai district and Mandiyur in Ramnad district (Raghunath, 1966; pp. 81-84).

The pre-historic investigations during 1981–82 in various parts of the Netravati river basin in South Kanara of coastal Karnataka led to the discovery of three Stone Age sites for the first time from the region. They include two Mesolithic and a Lower Palaeolithic site, and the Mesolithic sites are found at Mani and Uppinangadi. At Mani the implements are found on the lateritic hillocks, while at Uppinangadi they occur in a stratified primary context capped by four metre silt.

The above evidences from various parts of Karnataka, Kerala and Tamil Nadu clearly indicate that these regions were inhabited by the Mesolithic man, and hence an attempt is being made here to bring out the salient features and the possible chronology of these industries in this part of the country.

Typo-technology and raw material

It has been found that the microlithic technology continued through many cultures beginning from the early Mesolithic, if not earlier, to the late Chalcolithic or Megalithic. At a few places like Langhnaj (Sankalia, 1956 ; pp. 275–84), and Panchmarhi (Hunter, 1935 ; pp. 127-44), 1936 ; (Ghosh, 1948 ; pp. 1–18) microliths are found with pottery in varying proportions. In certain regions they are also found in association with painted pottery, iron and copper tools (Sankalia, 1960) (Misra, 1973 ; pp. 92-110). Yet another group is found without any pottery, metal objects or dominant geometric forms as in Singrauli basin (Krishnaswami and Soundara Rajan, 1951 ; pp. 40-65), Teri sites (Zeunner and Allchin, 1956 pp. 4–20 ; Rajendran 1979), Birbhanpur (Lal, 1958; pp. 4-48), Kerala (Rajendran, 1979), and coastal Karnataka (Rajendran, 1983 ; pp. 133–37). From the typo-technology of the Holocene cultures one can find the gradual evolution in their material cultures. The characteristic Neolithic-Chalcolithic blades are nowhere represented in any of the true Mesolithic industry. The absence of geometric tools, crested guiding ridge technique, ceramic and metal objects are some of the important features of a true Mesolithic culture which had hunting-gathering economy.

The term microlithic industry is primarily based on the morphology of the implements and it has been found that most of the Mesolithic implements recorded earlier were made on short blades. Presence of micro blade technology and the preparation of smaller implements have been thus very much emphasised for the Mesolithic culture. Mesolithic industries which consist of more non-microlithic implements, mostly based on flakes, have long been reported from various parts of South India. Work in recent years in differet parts of South-west and South-east coasts of India, in fact, substantiate the earlier evidences, and also project the salient features of the South Indian Mesolithic culture which definitely differ in their typology, technology, morphology and in the choice of raw material (Rajendran, 1983; pp. 133-37).

The Mesolithic industries of Karnataka, Kerala and Tamil Nadu generally show some identity in the choice of raw material and it has been found that the locally available quartz was extensively used in preparing the implements. The north Indian Mesolithic industries are mostly based on cryptocrystalline silica while a notable change for the quartz raw material is noticed in Karnataka and it is more conspicuous south of Mysore. The evidences recorded from the vicinity of Bangalore, coastal Karnataka and Kerala are exclusively on quartz while in Tamil Nadu quartz and chert are used in equal proportion. Preference for quartz raw material is also noticed in the Pre-Mesolithic industries of coastal Karanataka, Kerala and Sri Lanka.

Some of the most striking features of the Mesolithic industries in these regions include the dominance of macroflake implements, the lesser preparation of blades, rarity or total absence of geometric forms, presence of various types of points, availability of small choppers, non-association of pottery and metal objects and the preference for the locally available quartz raw material. These features altogether present a different charateristic to these South India Mesolithic industries which differ from the industries of central and north India.

The cultural material obtained from north and south Karnataka show slight variation between them and it is more conspicuous south of Mysore. In general, the implements of these three regions constitute various types of scrapers, blades, points, borers, burins, lunates, knives and small choppers. The-so called geometric forms (Clark, 1932) are found in certain industries in north Karnataka particularly in those reported form Shorapur Doab (Paddayya, 1974 ; pp. 590-607). Amongst the shaped tools scrapers are most common type. Even though short blades are represented they are less in number. Various types of points are commonly found in these regions and some of them obtained from coastal Karnataka, Kerala and Tamil Nadu are bifacial points. One of the other common type found in the coastal Mesolithic industries in South India is the choppers prepared unifacially or bifacially on smaller pebbles (Plates. I- V).

The Mesolithic industries of these three regions can generally be classified as non-geometric. Except a few geometric types such as trapezes and triangles from northern Karnataka no other sites in these regions have yielded them. It is important to note the high percentage of lunates in most of the sites in interior Karnataka. But it is pertinent to note that the lunates are rarely found in Coastal Karnataka, Kerala and Tamil Nadu while various types of points emerge as one of the characteristic tool in these regions.

The industries are mostly based on flake element contrary to their counterpart in central and north Indian Mesolithic industries where the implements are primarily made on micro-blades. The absence of microlithic character is conspicuous among the South Indian Mesolithic industries and most of the implements are made respectively on flakes, nodules, blades and pebbles.

There are a few discoveries of the Mesolithic artistic expressions in South India in the form of paintings and engravings in certain rock-shelters and caves (Erwin, 1983). The paintings include the discoveries made by Wakankar near Badami in Karnataka and the Marayur paintings from Kerala (Tampi, 1983). Engravings were first noticed in South India at the Edakkal cave in north Kerala (Fawcett, 1901; pp. 409-422). An almost similar kind of carvings as incisions have been recently discovered at Tenmalai Mesolithic rock-shelter (Rajendran, 1985; pp. 165-70).

Discussion and Conclusion

In India the Mesolithic cultural evidences are scattered far and wide throughout the length and breadth of the country (Allchin, 1968 ; Sankalia, 1974). They are found in various physiographical situations, ranging from the low sea-coast to the very hill-tops at higher elevations. Most of the Mesolithic evidences in India have been obtained from the surfaces. However, they are also found in well stratified context in places like Marahna Pahar (Brown, 1889 ; pp. 134-39, Gordon, 1950; pp. 64-90), Kurnool (Cammiade, 1924 ; pp. 83-105), (Murty, 1970; pp. 106-28), Kandivali (Todd, 1939; pp. 257-72) Sanganakallu (Subbarao, 1948 ; Sankalia, 1969), Langhnaj (Sankalia, 1965; pp. 326-46), Adamgarh (Joshi and Khare, 1966 ; pp. 90-95) Palavoy (Rami Reddy, 1968), Pachad and Hathkamba (Joshi and Bopardikar, 1972 ; pp. 47-51), Bagor (Misra, 1973 ; pp. 92-110), Walayar (Rajendran, 1979; Uppinangadi (Rajendran, 1983; pp. 133-37), Madhyakadamam (Reddy and Prakash, 1985 ; pp. 157-58) and in Tenmalai (Rajendran, 1985 pp. 20-23). At Marahna Pahar, Kandivali, Kurnool, Adamgarh and Madhyakadamam the Palaeolithic implements underlie the Mesolithic horizon. The excavations at Sanganakallu in Bellary dist. and Palavoy in Anantpur dist. show that the Mesolithic implements underlie the Neolithic culture.

The Mesolithic industries in Karnataka are mostly found as surface finds on laterite. The work of Subba Rao (1948) in the Sannarasamma hill has confirmed the Pre-Neolithic age to these industries. As a sequal to his discovery more work was carried out in Sanganakallu (Majumdar and Rajaguru, 1966; Sanklia, 1969; Ansari and Nagaraja Rao, 1969), and it has established that the microlithic industry of the Mesolithic culture in Bangaltola lie between Neoliths and Palaeoliths, and a date ranging from 3000 to 9000 B. C. has been proposed for the same (Sankalia, 1974). Stratigraphical position of the Uppinangadi Mesolithic site and thegeneral characteristics of the industry (Plate-VI), denote a hig antiquity to its culture.

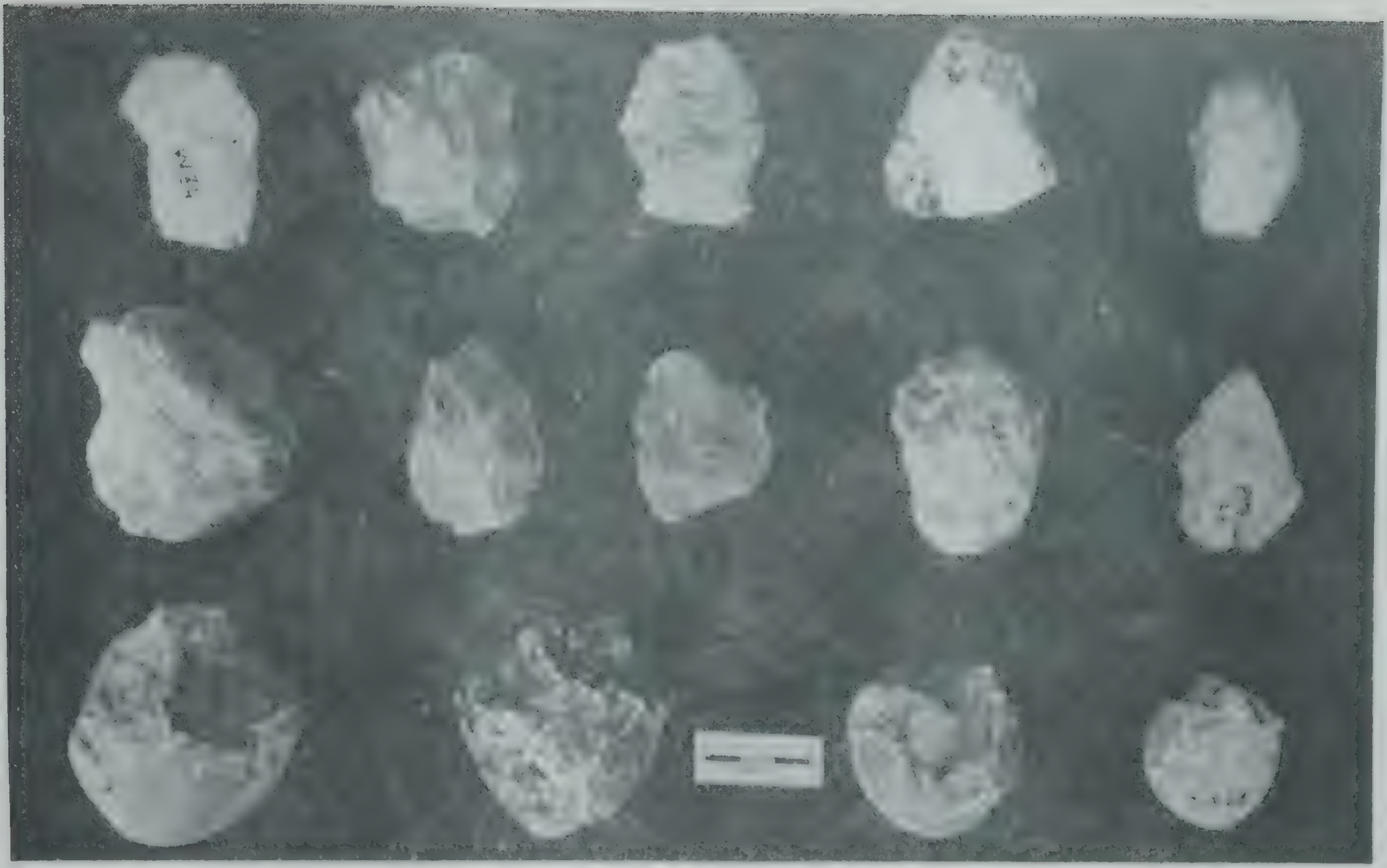
Work at Sawyerpuram, Idindakarai and Athankarai, in fact, indicate that the Mesolithic industries in Tinnevelly are *postterl* in Age (Rajendran, 1979). The sequence of geological formations observed at Idindakarai comprises a late Tertiary limestone at the base and this is overlain by beach rock at about 2 metres above high tide level. The top surface of the beach rock is rich in land snails in varying thickness which have been dated between 20,000 ± 395 Y. B. P. (B.S-134) and 33,670 ± 1640 Y. B. P. (B S.-133). The sand-dune which has uniform physical characteristics throughout its thickness rests disconfirmly over the land snails and the tools are found only on the surface of the teri and nowhere within the teri.

Field observations show that there are at least two strand line found at 20 and 4-6 m a. s. 1. between 8 and 10 km., inland from the present Tamil Nadu coast. The geomorphological data from the region indicate that the teris in Tinnevelli might have formed as regressional dunes during the low sea level phase of the terminal pleistocene when the climate was more arid than now. Since the artifacts are found only on the surface of the teri it can be inferred that the Mesolithic man had occupied this region after the formation sand dune. This probably suggests that there was an amelioration of climate towards greater humidity in the early Holocene which was more suitable for human habitation. An almost similar climatic sequence was also postulated for Gujarath on the west coast (Allchin and Goudie, 1971; pp. 248-265).

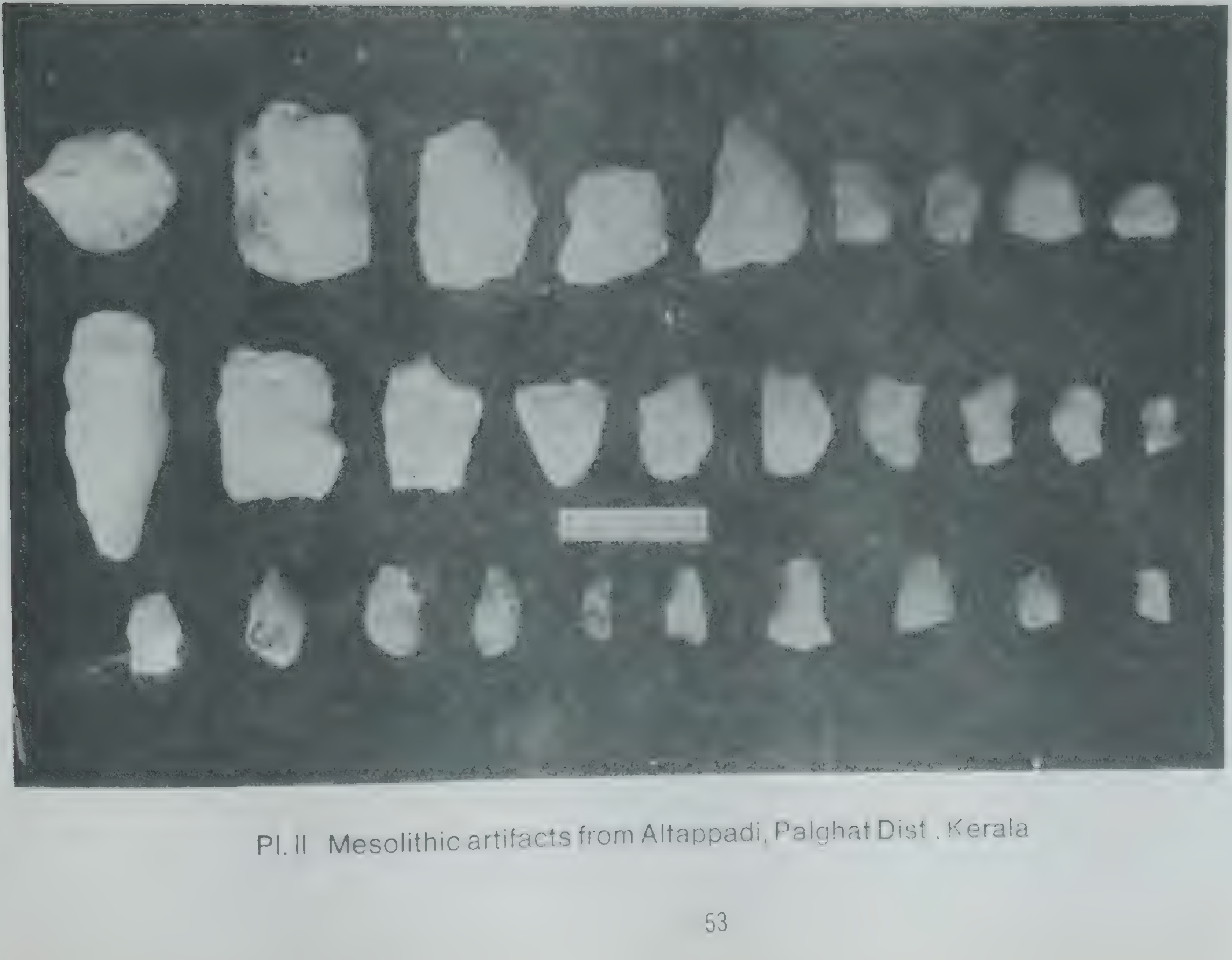
One of the most important geomorphological formations in Kerala and Coastal Karnataka comprises varied types of laterites which range in age from early Tertiary to pleistocene. Most of the Stone Age sites in these regions, especially of the Mesolithic period, occur on the lateritic surfaces in more or less undisturbed condition. None of these regions including Konkan have any clear cut evidence of late Pleistocene arid phase, as evidenced in Saurashtra and in the east-coast of Tamil Nadu. It is possible that the South-west coast of India might not have experienced any drastic climatic change during the Quaternary period (Rajaguru, 1973; pp. 80-87), (Guzder, 1980), while the south-eastern coast of Tamil Nadu experienced aridity during the terminal pleistocene (Rajendran, 1979). Semi-arid situations, as we see today, might have been the case even earlier in Karnataka Plateau.

Karnataka Stone Age sites are mostly located on the plateau region around the river basins and on the hillocks unlike those found in Kerala and Tamil Nadu where most of them are found in the midlands and near coasts. From the environmental point of view coastal Karnataka is one of the most favoured monsoonal tropical regions on the west coast as that of Kerala and Konkan, while the regions lie east of the Western Ghats in Karnataka and Tamil Nadu represent tropical semi-arid regions in the country. These differences reflect in their physiography, geomorphology and biomass which would have direct bearing in the cultural development in these regions. Irrespective of these environmental variations it is found that the Mesolithic industries obtained from Karnataka, Kerala and Tamil Nadu show more or less close similarity in their typology, technology, morphology and in the choice of raw material, and it seems that varied environments in these regions did not cause any hindrance in the development of an almost similar type of Mesolithic culture.

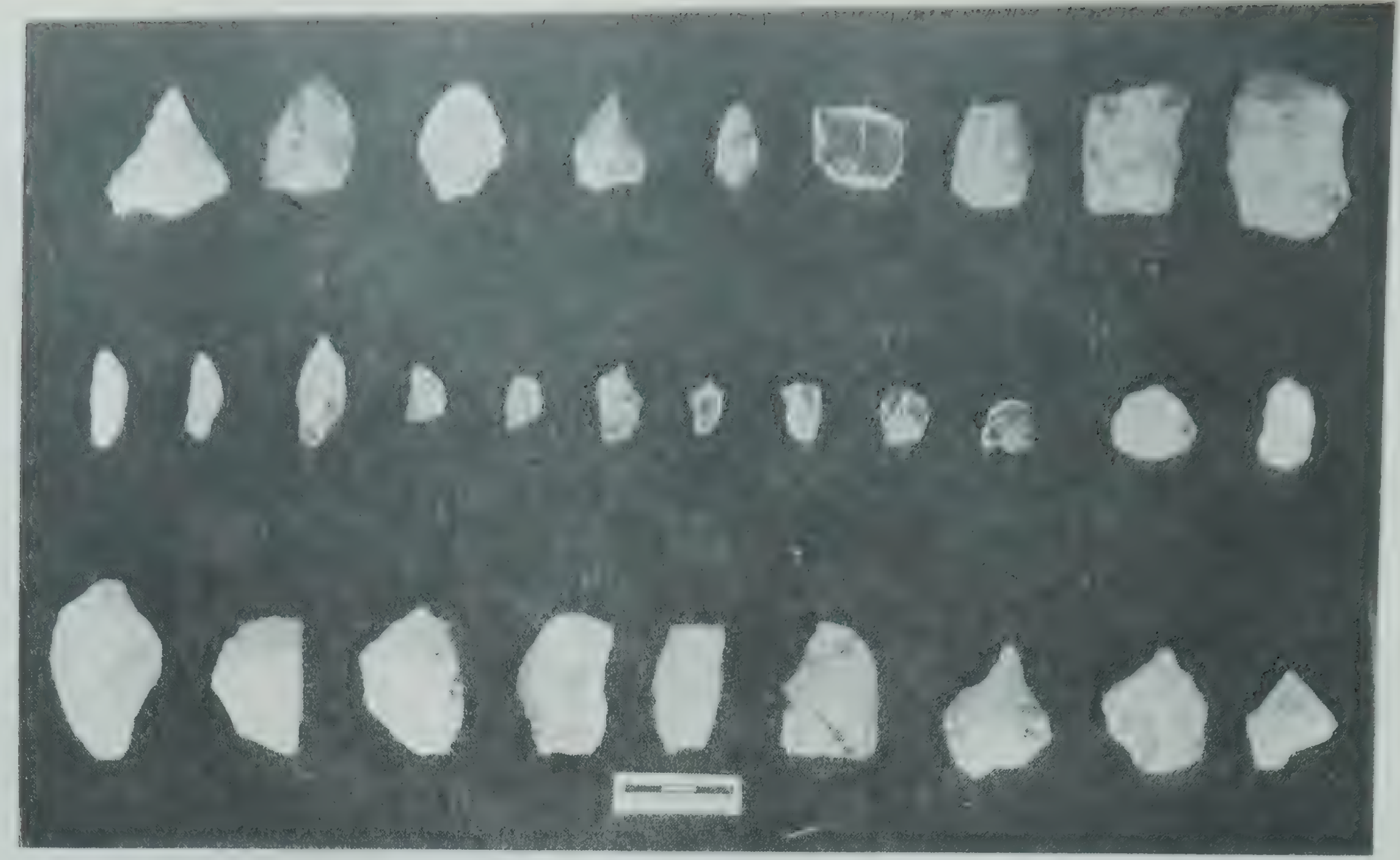
Industries which have greater similarities with those found in Karnataka, Kerala and Tamil Nadu have also been reported from other parts of India. The one which is very nearer to the region under discussion has been found at Vedullacheruvu in Rallakalava near Renigunta (Murty, 1970; pp. 106-28) and yet another has been reported from Palnad taluk of Guntur dist. (Soundara Rajan, 1958 pp. 49-113). These industries are non-geometric and asceramic, and are exclusively on quartz. Madhyakadamam Mesolithic industry in the Gambheeram river basin on the north-eastern coast of Andhra Pradesh has clearly indicated the chronological phase of the Mesolithic culture (Reddy and Prakash, 1985; pp. 157-8). The Birbhanpur industry on the Damodar river valley in Burdwan dist. of West Bengal (Lal, 1958; pp. 4-48) has close similarity with the Mesolithic industries of South India and they are non-geometric and asceramic. The implements



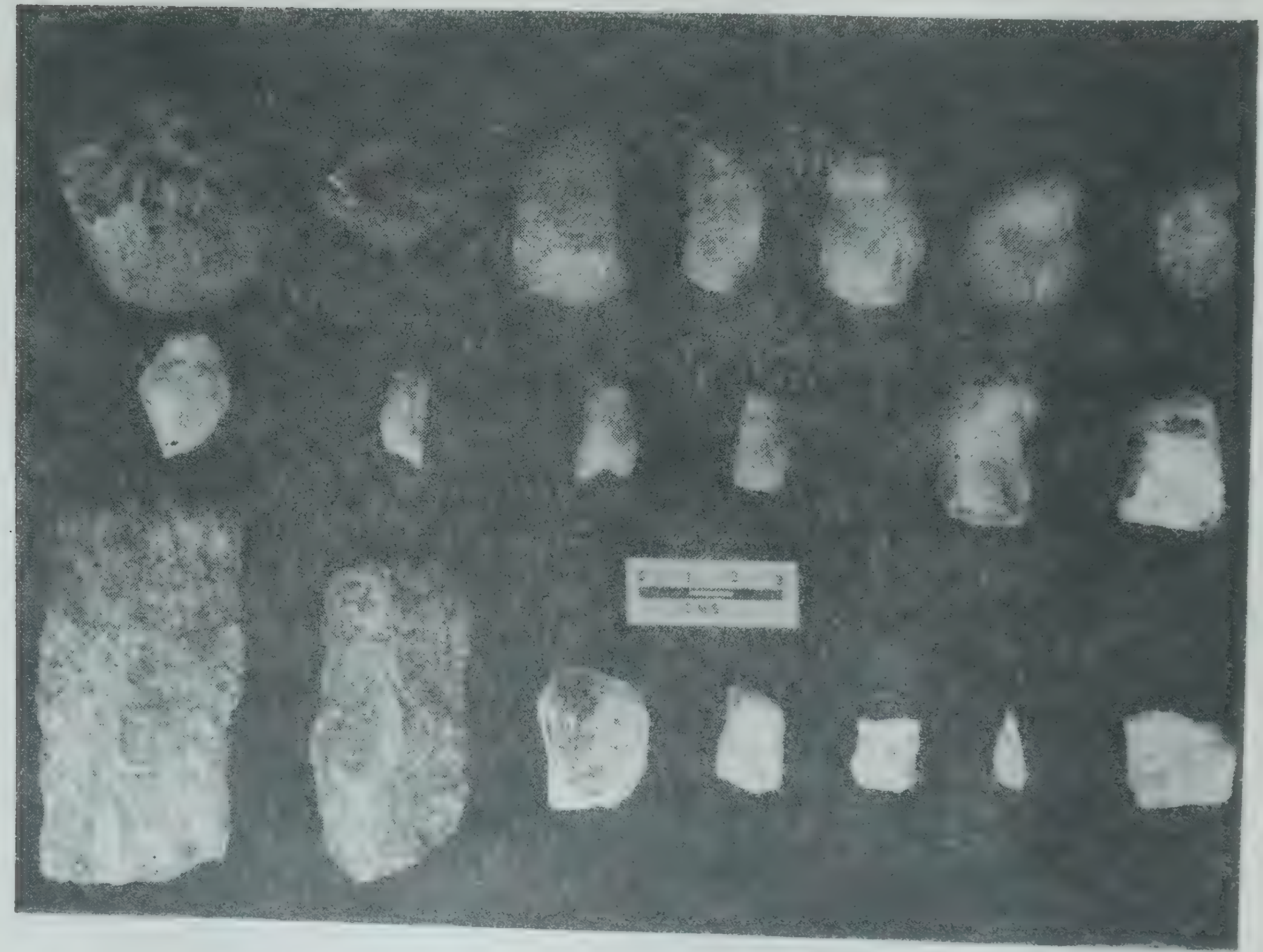
Pl. I Mesolithic artifacts from Malampuzha, Palghat Dist., Kerala



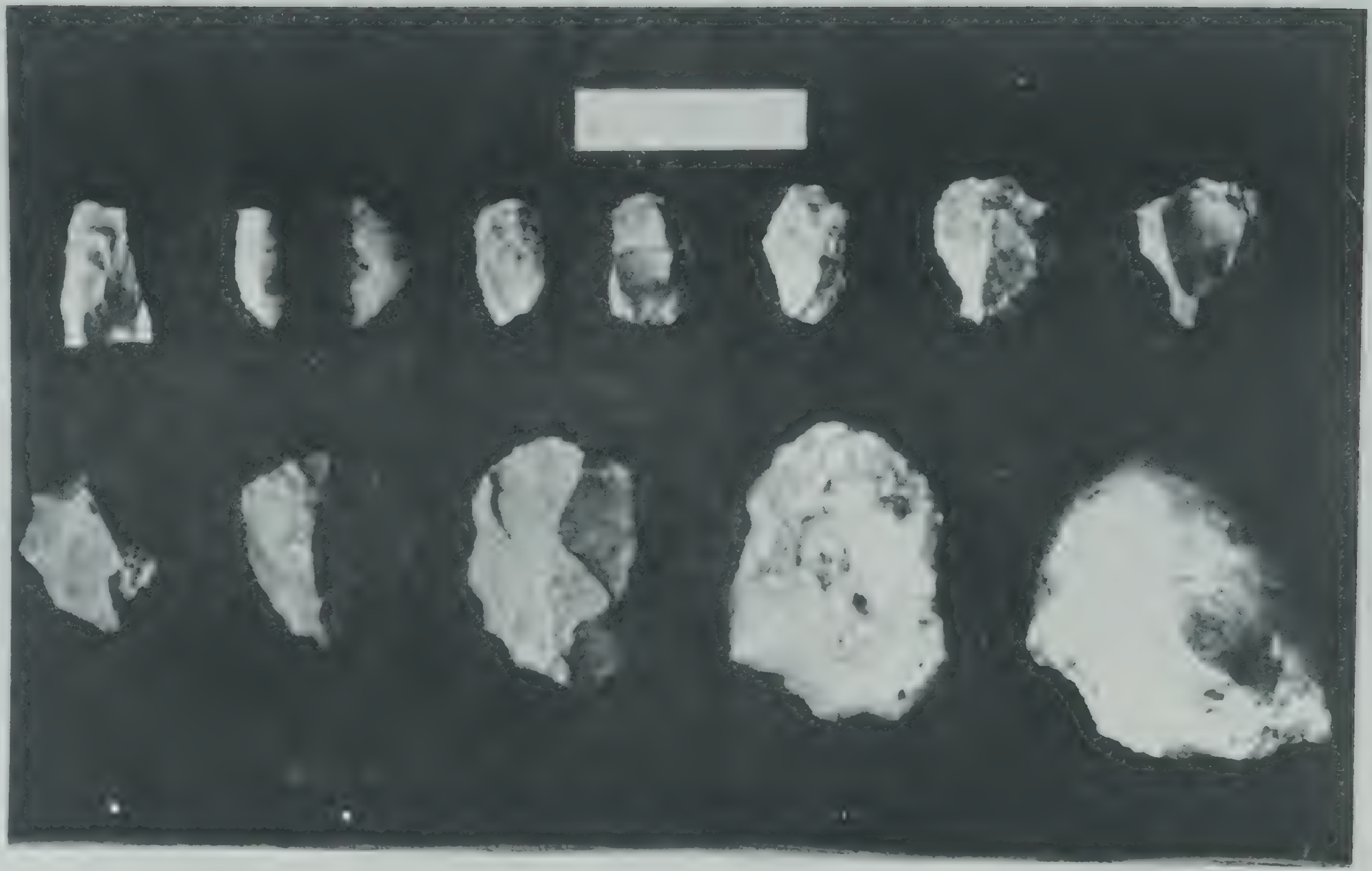
Pl. II Mesolithic artifacts from Altappadi, Palghat Dist., Kerala



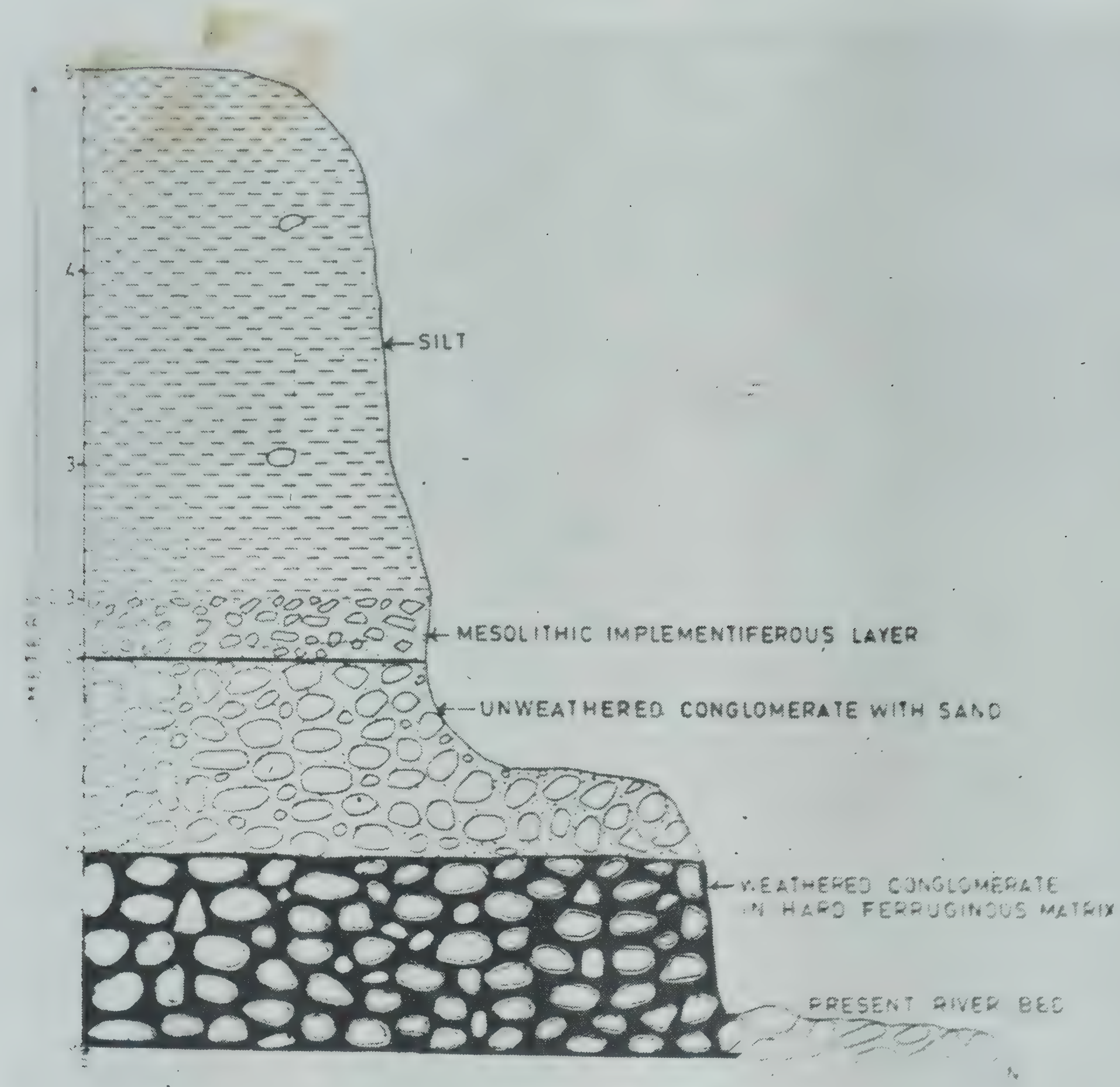
Pl. III Mesolithic artifacts from Padippara, Palghat Dist., Kerala



Pl. IV Mesolithic artifacts from Tenmalai, Quilon Dist., Kerala



Pl. V Mesolithic artifacts from Sawyerpuram, Tinnevelli Dist., Tamil Nadu


5
4
3
2
METRES
SILT
MESOLITHIC IMPLEMENTIFEROUS LAYER
UNWEATHERED CONGLOMERATE WITH SAND
WEATHERED CONGLOMERATE IN HARD FERRUGINOUS MATRIX
PRESENT RIVER BED

Pl. VI Stratigraphical position–Mesolithic site–Uppinangadi are mostly on quartz, and the geomorphological studies have assigned an earlier date to the industry (Lal & Lal 1961 ; pp. 37–45).

An industry of greater antiquity has been reported from Sarai Nahar Rai (Dutta, 1971) pp. 500–501 which predominantly consists of quartz implements. Though the industry consists of geometric forms it has indicated a higher C^{14} date of around 8000 B.C. It is pertinent to note here that although the Tenmalai rock–shelter is relatively a late Mesolithic habitation site the industry does not consist of neither geometric forms nor pottery, or any other kind of metal objects, which, infact, indicate a true Mesolithic phase even around 3000 B.C. in South India.

The industry from the Singrauli basin in Mirzapur dist. of Uttar Pradesh (Krishnaswami and Saundara Rajan, 1951; pp. 40-65) is comparable with the Mesolithic industries of South India. It is found in a stratified context and the implements are predominantly of limpid quartz. The industry is non–geometric and asceramic, and according to Sankalia (1974: p. 237) this industry may be a degenerate late Upper Palaeolithic blade industry, ascribed to an early Mesolithic period. It has been mentioned that the evidences obtained from the excavations in Allahabad and Mirzapur dists. confirm the divisions of the microlithic industry into pre–pottery microliths and microlith with pottery (Sankalia, 1974:p. 240) and this division definitely places Coastal Karnataka, Kerala and Tamil Nadu industries into the pre-pottery phase which has greater antiquity.

The observations made by Allchin (1966) on the Mesolithic industries of Sri Lanka and Tamil Nadu have shown their similarity. Later studies in various parts of Kerala and Tamil Nadu have shown their close identity with the Mesolithic industries of Sri Lanka (Rajendran, 1979; Sitrampalam, 1980). Recent studies in Karnataka have also proved to be the same and these evidences show a peculiar cultural identity to the Mesolithic industries of South India and Sri Lanka. The C^{14} dates for the Sri Lankan Mesolithic industry, however, indicate a late phase of the terminal Pleistocene, dating 28000 B.P. (Deraniyagala, 1973; pp. 11–27).

The above observations perhaps help, to some extent, in understanding the Mesolithic cultural phase in these parts of South India. The Mesolithic culture in India is generally accepted as belonging to the Holocene period and it has been justified by some of the C^{14} dates obtained from Sarai Nahar Rai (Dutta, 1971) pp. 500–501 Bager (Misra 1973; pp. 92–110), Adamgarh (Joshi, 1978), Tenmalai (Rajendran, 1985) pp. 165–170 etc. They show a period ranging from 2500 to 8000 B. C., and perhaps future work in different parts of South India may push back the Mesolithic culture to a greater antiquity, as found in Sri Lanka.

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8. PALAEONTOLOGY OF THE KRISHNA BASIN WITH SPECIAL REFERENCE TO KARNATAKA

G. L. Badam

Introduction

The river Krishna (Fig. I) is one of the major easterly flowing rivers in Peninsular India. Originating on the eastern slope of the Mahabaleshwar plateau, at an altitude of about 1,337m above sea level, it flows across the entire breadth of the Peninsula from west to east through the states of Maharashtra, Karnataka and Andhra Pradesh before emptying into the Bay of Bengal. Its total length is about 1,400 km and the total drainage about 2,59,000 sq. km. The river in general follows the southeastern course though it seems to have shifted course at a few places. However, the changes in the course of the river are not major as those observed in the rivers of the Indo-Gangetic plain. Some of the important tributaries of the Krishna river are the Malaprabha, the Ghataprabha, the Tungabhadra, the Bhima, the Ghod and the Hunsgi.

In its upper reaches, the Krishna river has a moderately meandering course cutting through the Deccan Trap. Further down it flows through Precambrian Kaladgi sediments, comprising conglomerates, sandstones, quartzites, chert, limestone and shales. In the latter region, laterites are found capping the surfaces at elevations of 550–600 m amsl. The Krishna and its tributaries have cut their valleys in these lateritised surfaces. In its middle and lower reaches, the river cuts through the Archcaean Formation.

Litho – and Bio–Stratigraphy

The Pleistocene deposits, mostly of alluvial origin, are widespread throughout the course of the river irrespective of variations in climate, topography and lithology. The conspicuous geomorphic features observed in the Krishna Valley reflect the phenomenon of aggradation and the rejuvenation of streams which are the result of eustatic, tectonic or climatic changes during the Pleistocene.

The alluvium in the basin, which has a total thickness of 20 to 25 m, is made up of bouldery, pebbly or sandy-pebbly gravels and associated silts which are predominant in nature. The alluvium in the upper reaches has a lateral extent of 0.5 to 1 km. whereas in the lower and middle reaches, where the Krishna has an appearence of a misfit stream, its lateral extent varies from 2 to 3 km. on either bank.

The dating of the alluvium and the associated Stone Age industries found in the Krishna basin is based on a few radiocarbon dates and on typological comparisons of the industries with similar industries from other regions. Lower Palaeolithic industry in the Krishna basin is akin to the terminal phase of the Middle Acheulian on typo-technological grounds and can be tentatively assigned to the late Middle or early Upper Pleistocene period. The radiocarbon dates available for the Older Alluvium yielding tools of Middle Palaeolithic culture suggest an age of about 30,000—39,000 years B.P. Hence the Middle Palaeolithic culture is of Upper Pleistocene period. The black soil that caps the terrace surface of the Older Alluvium has been dated to 7000 B.P. (early Holocene). The younger sub–Recent alluvium belongs to post-black soil formation.

The Krishna river has yielded scant faunal material and less Stone Age tools than other Peninsular rivers despite similar ecological and geological conditions. There are only a few reports of fossils from the Krishna and its tributaries which are described below

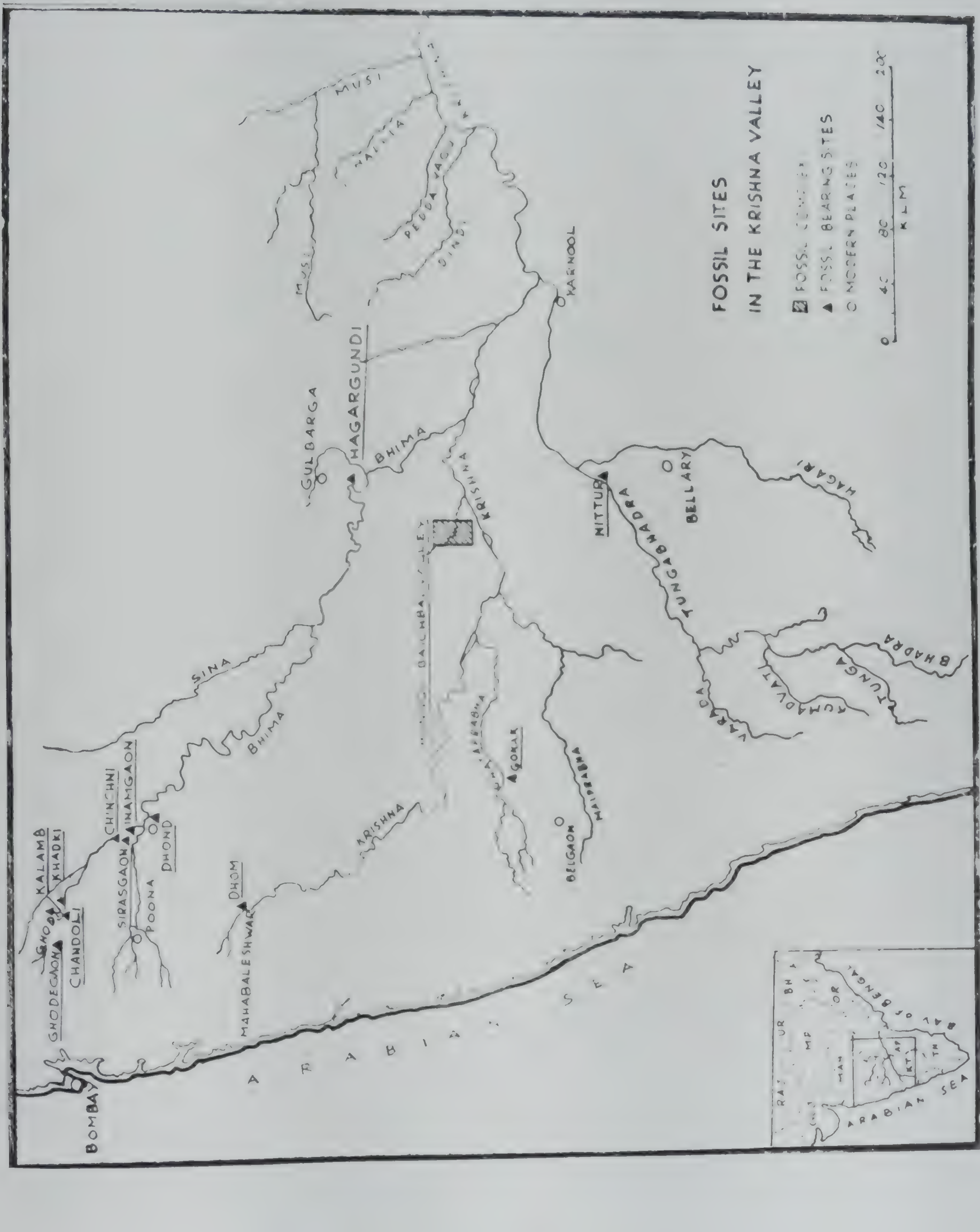

FOSSIL SITES
IN THE KRISHNA VALLEY
▨ FOSSIL CEMETERY
▲ FOSSIL BEARING SITES
○ MODERN PLACES
0 40 80 120 160 200
KLM
BOMBAY
GHODEGAON
CHANDOLI
GHOD
KALAMB
KHADKI
CHINCHNI
INAMGAON
SIRASGAON
POONA
DHOND
DHOM
MAHABALESHWAR
KRISHNA
BHIMA
SINA
GULBARGA
HAGARGUNDI
BHIMA
MUSI
MUSI
HALIYA
PEDDA VAGU
DINDI
KRISHNA
KARNOOL
BAICHBAL VALLEY
KRISHNA
GHATAPRABHA
GOKAK
MALAPRABHA
BELGAON
NITTUR
BELLARY
TUNGABHADRA
HAGARI
VARADA
KUMADVATI
TUNGA
BHADRA
ARABIAN SEA
RAJ
UP
BH
MP
OR
GUJ
MAH
AP
KT
TN
BAY OF BENGAL
ARABIAN SEA

Fig. 1.

under three main headings : a) the Upper Krishna Valley, b) the Ghod Valley, and c) the Hunsgi Valley (Fig. II).. In view of the rich faunal yield from the Ghod and Hunsgi valleys they have been dealt separately.

a) Upper Krishna Valley

The alluvium deposited in the upper reaches of the Krishna can be divided into coarse and fine alluvium. The bouldery and cobbly gravels, which are generally common here, occur as discontinuous fragmentary bodies and are between 1.5 and 2 m in thickness. The gravels, generally poorly sorted, crudely stratified, ungraded and unimbricated, are found at the base of the cliffs and lie unconformably over the eroded surfaces of the parent rock. The angular boulders and cobbles indicate colluvial nature and dominance of lateral transport. Sandy pebbly gravels and sandy gravels often exhibit cross bedding. The matrix, which is often coarse sand, is either ferruginous or calcareous. Silty deposits, which form the main constituent of fine alluvium, are traversed by kankar concretions and caliche bands. The silts often overlie coarse as well as fine gravels.

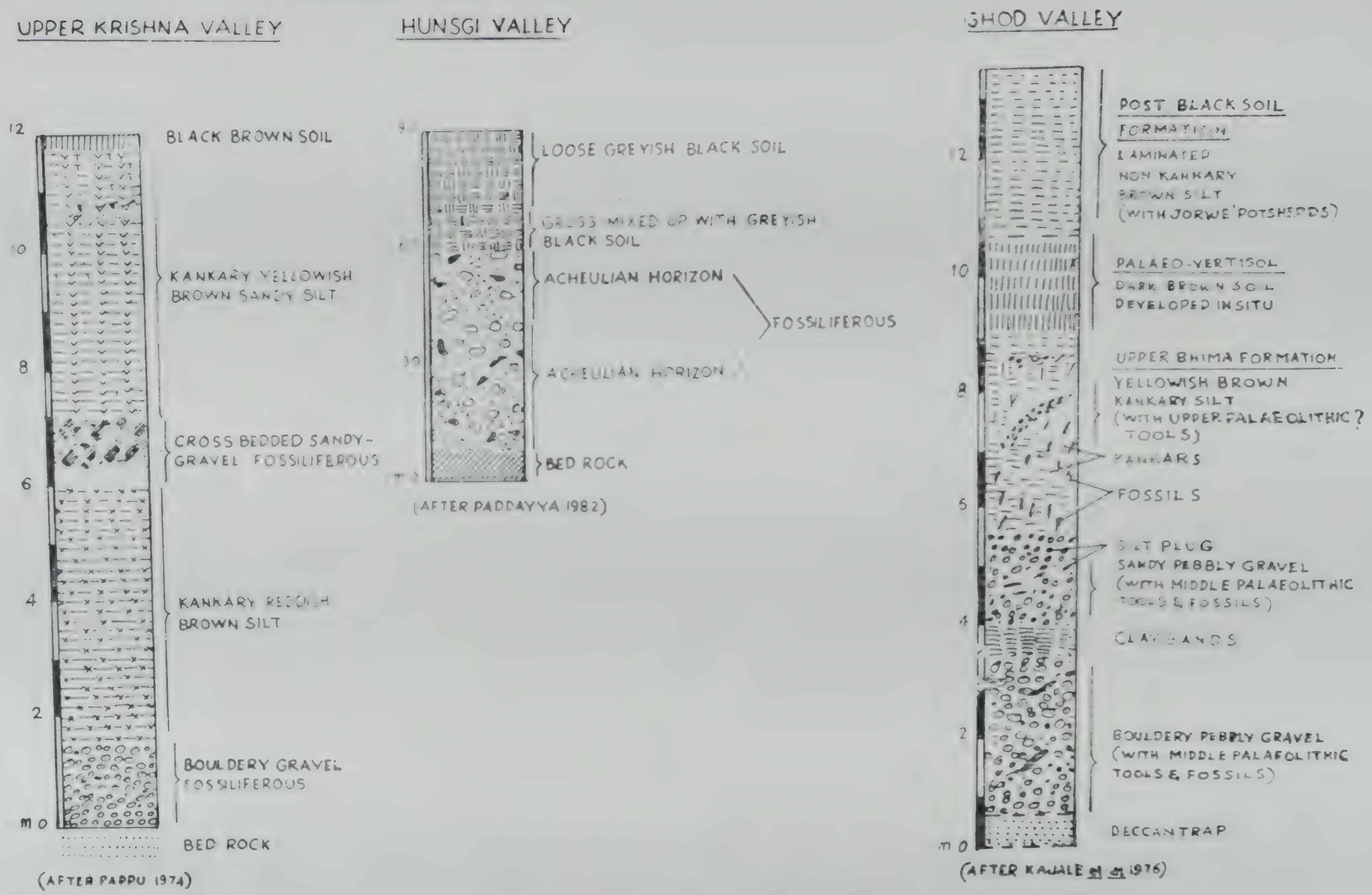
Perhaps, the earliest record of fossils from the Krishna Valley as a whole is by Foote (1876 ; pp. 1–265). He discovered fossils of *Bos namadicus* (*?*) and an upper jaw os rhinoceros, which he described as a new species *Rhinoceros deccanensis*, from the ossiferous deposits near Gokak in districe Belgaum on the Ghataprabha river. Thet fossils mentioned above and the numerous molluscan shells which came from non-implementiferous areas were recovered from a section exposed on a bank of a stream near the village Chikdauli, situated 5 km east of Gokak.

There was almost no report of fossils from the Krishna for nearly a century, when (Paddayya, 1969 ; pp. 12–14) discovered a fossiliferous Middle Palaeolithic site near Hagargundi, on the left bank of the river Bhima. The fossil yielding section lies about 1 km. downstream of Hagargundi. The course of the river here is characterised by many sinuous curves and the site of Hagar gundi is located at the height of one such meander. The faunal material comprises jaw fragments of *Bos namadicus*, antler pieces of cervids, a scapula and a pelvic bone of *Elephas*, in addition to a number of limb-bones and rib fragments which are beyond identification. The fossils are found in the sandy pebbly gravel horizon of the litho stratigraphic sequence. In fact, the importance of Hagargundi centres around the occurrence of animal fossils as this is perhaps one of the very few sites in the Krishna Valley where Stone Age tools occur in association with vertebrate fossils.

Subsequently, Ansari (1970 ; pp. 1-7) discovered fossils of *Bos namadicus* and *Babalus* sp. in association with both Lower and Middle Palaeolithic tools from the village Nittur, situated about 6 km. west of Tekkalkota, on the right bank of the river Tungabhadra. The fossiliferous sections near Nittur are about 5 m above the river bed. At the exposed base is a layer of pebbly gravel about 35 cm thick being covered by sub-Recent dark brown silt. Middle Palaeolithic tools were recovered from this gravel. Some of the tools were also found scattered in the loose bouldery gravel exposed between the river sections and water course along with fossil fragments of *Bos namadicus.*

Corvinus *et al.* (1972/73 ;p p. 53–69) reported more fossils from various sites in the Krishna basin which are as follows :

a) Fossils of *Bos* sp. were discovered along with Middle Palaeolithic tools in sandy pebbly gravel ranging in thickness from 2 to 5 m, from the Bhima river valley near Dhond.


UPPER KRISHNA VALLEY
12
10
8
6
4
2
m 0
BLACK BROWN SOIL
KANKARY YELLOWISH BROWN SANDY SILT
CROSS BEDDED SANDY-GRAVEL FOSSILIFEROUS
KANKARY REDDISH BROWN SILT
BOULDERY GRAVEL FOSSILIFEROUS
BED ROCK
(AFTER PAPPU 1974)
HUNSGI VALLEY
10
LOOSE GREYISH BLACK SOIL
GRUSS MIXED UP WITH GREYISH BLACK SOIL
ACHEULIAN HORIZON
ACHEULIAN HORIZON
FOSSILIFEROUS
BED ROCK
(AFTER PADDAYYA 1982)
GHOD VALLEY
12
10
8
6
4
2
m 0
POST BLACK SOIL FORMATION
LAMINATED NON KANKARY BROWN SILT (WITH JORWE POTSHERDS)
PALAEO-VERTISOL
DARK BROWN SOIL DEVELOPED INSITU
UPPER BHIMA FORMATION
YELLOWISH BROWN KANKARY SILT (WITH UPPER PALAEOLITHIC ? TOOLS)
KANKARS
FOSSILS
SILT PLUG
SANDY PEBBLY GRAVEL (WITH MIDDLE PALAEOLITHIC TOOLS & FOSSILS)
CLAY BANDS
BOULDERY PEBBLY GRAVEL (WITH MIDDLE PALAEOLITHIC TOOLS & FOSSILS)
DECCAN TRAP
(AFTER KAJALE et al 1976)

LITHO - AND BIO-STRATIGRAPHY OF THE KRISHNA VALLEY

Figure II.

b) Dhom Dam in the Krishna river proper yielded a tusk of *Elephas* from bouldery gravel 8 m thick, along with shells of *Unio* dated to $37{,}640 \pm^{9200}_{4250}$ years B.C.

c) Borkhal Dam, on the main channel of the Krishna, yielded fragments of *Elephas* tusk from a 10 m thick sandy pebbly gravel.

At Dhom Dam and Borkhal Dam, however, no implements were discovered.

Recently, tuffaceous beds containing plant impressions as well as Middle Palaeolithic tools were reported for the first time in India by Koriesetter *et al.* (1976-77; pp. 62-65). The discovery was made at Wajjal (16° 29′ N : 76°33′ E), about 23 km west of the taluk town of Shorapur, Dist. Gulbarga, Karnataka. The section yielding the plant fossils is located on the right bank of Hunsgi stream, a northerly tributary of the Krishna.

b) Ghod Valley

The Ghod is an easterly flowing tributary of the river Bhima originating in the Western Ghats about 75 km. northwest of Pune and flowing for a distance of about 160 km over the Deccan Traps before its confluence with the river Bhima. The river has, in recent years, yielded half a dozen palaeontological sites namely Inamgaon, Sirasgaon Kanta, Chinchini, Chandoli, Khadki and Kalamb (Kajale 1979). All the sites are located upstream of Inamgaon – the locality that has yielded one of the richest palaeontological treasures in the Deccan.

Pleistocene formations in the Ghod Valley are fluvial in origin and rest unconformably on the Deccan Traps of Cretaceous–Eocene age. Two litho-units can generally be identified, the basal sandy pebbly gravel about 5 m thick capped by a 5 to 10 m thick unit of fine sands, silts and clays which is in turn overlain by about a meter thick Black cotton soil of early Holocene age. Excavations carried out during the last three years in these formations, have yielded Middle Palaeolithic tools (chiefly scrapers) along with fossils in the gravel beds while in the brown silty sand, unrolled Upper Palaeolithic blades of chalcedony were found associated with the faunal material.

The animal species identified so far, out of a collection of about 700 fossil fragments, as a result of excavations and explorations, include osteological and dental remains belonging to *Elephas maximus*, *Elephas hysudricus*, *Bos namadicus*. *Babalus* sp., *Cervus unicolor*, *Canis* sp., *Equus namadicus*, *Hippopotamus* sp., and Chelonia (possibly *Trionyx*), *Sus* and *Lepto- bos.* The discovery of fossil hippo in the Ghod is of special significance as it increases the geographical range of this animal to the south of Godavari before becoming extinct. Its presence has a profound bearing on the palaeoecology of the Ghod at a time when the sediments were being deposited. This was found in a gravel bed associated with molluscan shells (*Unio*) which have been C-14 dated to 20,000 years B.P. Majority of the other fossils came from the base of the yellow silt which is strongly calcreted.

Leptobos sp. and *Sus* sp. have been reported from the Ghod Valley for the first time (Badam, *et al.* 1983 ; pp. 251–52). While the former, which is the biggest fossil find from the area so far, was excavated from within the yellow silt, the latter came from the underlying gravelly beds. *Leptobos* is represented by a basicranial part of skull with two horns almost intact. The horns are 72.5 cm in length each while the distance between the two tips is 80 cm. The girth of the horns at the base, centre and the tip respectively is 37.5 cm, 30 cm and 15 cm. The horns, which in general point outward and upward, are longitudinally striated along the whole length and their section profiles vary from ellipsoid near the base to round near the tip. Detailed study of the new faunal material is under progress with emphasis on toponymy.

The Ghod Valley is very interesting in that a lot of faunal material belonging to the domesticated and wild varieties has been recovered as a result of horizontal excavations from the Chalcolithic mound (c 3600 -c 2700 B. P.) at Inamgaon just opposite to the fossil site. Further, a Mesolithic site dating to c 12000 B.P. has also been discovered near the Chalcolithic mound (Rajaguru *et al.*, 1980 ; pp. 150-159), but a palaeontological record for this period is lacking at present. Faunal material, if discovered from the Mesolithic site in future, may throw important light on the process of domestication of some animals in this area, since some of the Pleistocene animals discovered here are directly or indirectly related to a few domesticated animals found at the archaeological site.

c) Hunsgi Valley

Recently, Paddayya discovered numerous fossils from various Acheulian occupation sites in the Hunsgi Valley in Karnataka. These include fossils of *Bos namadicus, Bubalus, Equus namadicus, Equus, asinus, Elephas,* Cervidae and/or Boselephinae, and turtles, which are under a detailed study. The fossiliferous sites are covered by thin sediments and some of them are located away from the Hunsgi river. This rules out the possibility of any strong fluvial sedimentary depositional environment as obtained in the other peninsular fossiliferous areas. It is this situation that makes the Hunsgi Valley unique in more than one way.

Some of the fauna has been recovered from an ancient gulley now filled up with debris. These gullies in the limestone escarpment, resulting due to an excessive erosion by rain waters, were probably a regular phenomenon in the past. These gullies might have served as a suitable place for scavengers to hide their prey.

The dead animals must have been exposed for longer periods before their burial as indicated by the fragmentary nature of the fossils. Several breakages in the collection e. g. irregular perpendicular breakage and spiral breakage, seem to be all post-mortem. Some bones do have gnawing and chewing marks and indications of charring but not sufficient enough to be attributed to human activity at this stage of our knowledge.

As indicated above, the fossil assemblage is found in a unique geomorphic setting and a detailed toponomical study may throw important light in understanding the nature and process of fossilisation and the man—animal relationship in the area during the Acheulian times.

Palaeoecology

Isolated and scanty faunal material discovered from various localities in the Krishna Valley as a whole, makes it difficult to visualise the palaeoecologic situation the valley during the deposition of the late Pleistocene sediments. The few occurrences of fossils at Gokak, Nittur, Hagargundi, Borkhal Dam etc. (some of them found in association with various Stone Age tools), though important in their own way, do not much contribute to our understanding of the palaeoclimate and the lifeways of the prehistoric man in the area. However, certain interpretations based on the rich yield of fossils and Stone Age tools in the Ghod and Hunsgi valleys may allow some generalisation of the palaeoclimatic history and palaeogeographical distribution of some of the animals in the Krishna Valley as a whole. It is interesting to note that in a generally semi-arid, sub-tropical climate obtaining in the valley, there were several favourable ecological niches for animals like elephant, hippo potamus, turtles etc to thrive within certain geographical limits. Some areas in the Ghod and the Hunsgi do provide slight departures from the general climatic conditions. For example, in the Ghod the discovery of *Hippopotamus* and *Trionyx* and the presence of lenticular bands of silt and clay in the pebbly gravel indicates stagnant water pools in the area. The presence of equids, cervids, bovids and elephants point to the tropical, semi-arid Savannah type of environment in the valley as whole, interspersed by the presence of rolling plateaux of basalts.

In the Hunsgi Valley the presence of almost similar fauna throughout the period ranging from Acheulian to Neolithic may indicate a stability in the climatic conditions. *Bos, Equus. Elephas* and cervids point to a grassland type of ecology. The nearby rivers with dense foliage (which exists even today) must have provided good avenues for the large mammals to thrive in the area. It appears reasonable to believe that dry to wet subhumid climate existed in some pockets during the recent past where animals flourished.

It is to be emphasised that detailed work in the Hunsgi and Ghod valleys has brought to light many sites yielding fossils in association with Stone Age tools. The Hunsgi valley has yielded tools and fossils in a more or less primary context which reflects on a possibility of better man-animal relationship than existed in any other site in the Krishna Valley. In the Ghod Valley (which yielded one of the richest palaeontological treasures in the Deccan) the biotic factors prevalent during the Pleistocene must have played an important role in attracting the Palaeolithic settlers to this location.

Though the inferences on ecology and man-animal relationship, on the basis of scanty findings, is difficult at present, the discovery of various new archaeological and palaeontological sites during the last few years has added new dimensions to our understanding of the life ways of the prehistoric man in the area. However, the exact role of prehistoric man in exploiting the contemporary fauna will remain somewhat enigmatic till more primary/semiprimary sites are discovered and excavated in these areas.

It is clear from the foregoing that palaeontological research in the Krishna Valley needs rigorous attention. The scanty material found from various areas other than the Hunsgi and Ghod may be attributed to incomplete sampling. However, the present work raises some hope that the palaeontological study, if undertaken systematically in the valley, will bring to light many more fossil sites in association with Stone Age tools than has been done in the past. That will in turn not only help us in a better understanding of the man-animal relationship in the past but also give more exacting information about the palaeoecology of the Krishna valley during the Pleistocene.

The palaeontological and archaeological findings discovered in the valley so far are summarised in the Table 1.

ACKNOWLEDGEMENTS

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Table 1 : Palaeontological and Archaeological material from the Krsihna Valley

	Rivea/Tributary	Sites	Biological material	Archaeological material	Relative/ Absolute date
Upper Krishna Valley	Krishna river	Dhom Dam Borkhal Dam	*Elephas* tusk		$37640 \pm {}^{9200}_{4250}$ y.b.p.
	Bhima river	Dhond	*Bos* sp.	Middle Palaeolithic	Late Pleistocene
		Hagargundi	*Bos namadicus* *Elephas* sp. Cervids	Middle Palaeolithic	
	Tungabhadra river	Nittur	*Bos namadicus* *Bubalus* sp.	Lower and Middle Palaeolithic	Late Pleistocene
	Ghataprabha river	Gokak	*Bos namadicus* (?) *Rhinoceros deccanensis*		
Ghod Valley	Ghod river	Inamgaon Chinchini	*Bubalus* sp. *Canis* sp.	Middle to Upper Palaeolithic	20,000 y.b.p. and 39,000 y.b.p.
		Chandoli	*Elephas maximus,*		$(21{,}725 \pm {}^{630}_{585})$
		Khadki Kalamb Sirasgaon–Kanta	*Elephas* sp., *Bos namadicus, Equus namadicus, Hexaprotodon palaeindicus, Cervus unicolor, Sus* sp. *Leptobos* sp.		

	River/Tributary	Sites	Biological material	Archaeological material	Relative/ Absolute date
Hunsgi Valley	Hunsgi river		*Bos namadicus*, *Equus namadicus*, *Elephas* sp., *Bubalus* sp., Cervidae, *Equus asinus*, *Boselephus*, Turtles	Acheulian to Neolithic	Late Pleistocene

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9. BANAHALLI : A NEOLITHIC SITE

C. Krishnamurthy

It was generally believed by the scholars that the southern group of neolithic cultures jumped into the iron age Megalithic skipping the chalcolithic stage. But as early as 1883 itself, Robert Bruce Foote, had reported the discovery of a 'Channel lipped bowl' from Patapadu in Banganapalle taluk of Kurnool district along with some microliths (non-geometric) including short blades of chert and agate. Further work at the same site by F. R. Alchin yielded painted pottery comparable with that of Chalcolithic assemblage said to be an intrusive element from northern Deccan or beyond, during the upper neolithic period. The sites explored by the Archaeological Survey in Kurnool district were revisited in 1967-68 by I. K. Sharma and established the presence of a separate painted pottery tradition around Kurnool and Cudappah region of the Pennar basin.

On the other hand during the same year (1967-68) a team consisting of I. K. Sharma, C. Margabandhu and K. Krishnamurthy led by S. R. Rao undertook preliminary survey of the neolithic and megalithic sites in Kolar district with a view to understanding the relationship between the neolithic cultures of the Pennar (Kurnool district) and the Palar (North Arcot district) basins and to ascertain whether the painted pottery tradition of the Kurnool region extended into the Kolar region. The result of this survey was highly rewarding as three most important neolithic-cum-megalithic sites and a few megalithic sites (Doddakadattur, Kendatti and Banahalli) were brought to light.

Doddakadattur, situated at a distance of 22 km. on Kolar-Malur road, is an open air site with a couple of rock shelters. The most important feature of this site is in having large pits containing polished axes, ash, burnt rice and husk. The walls of the pits were occasionally plastered with mud. The pottery included pale grey (in which bowl with ochre-painting on the rim was noteworthy) and coarse gritty red ware of the neolithic period. It can be mentioned here that one more site has been brought to light (C. Krishnamurthy) at Tambarahalli, in Bangarpet Taluk of district Kolar, where several such pits - numbering thirty and generally of 2.0m diameter and 1.5m depth- yielding slow wheel turned and partially burnished pottery of the neolithic period and rich ash deposit, were noticed.

Site at Kendatti (Kolar Taluk, Kolar district) is at the foot of a granite hill and has several rock shelters yielding neolithic and megalithic pottery assemblage. The surface finds belonging to neolithic period include burnished grey and coarse red wares, polished axes (both pointed and blunted butts), mullers and pounders. (whereas the black-and-red, red-slipped and black-slipped wares and iron slags were also abundantly found.)

The site at Banahalli, (Lat. 12° 58′ N, Long. 78° 6′ E.), the subject matter of the present paper, probably represents the largest neolithic-megalithic settlement in South India. The village Banahalli is situated at a distance of 2 km from Tekal railway station on the Bangalore-Madras broadguage line of the Southern Railways and lies at a distance of 2 km to the east-north east of Malur-Bangarpet road and is approached by a metal road. Buses ply regularly between Bangalore-Bangarpet and Malur-Bangarpet. It lies on the upper reaches of the river Palar, and is aptly called *'Bettada-Banahalli'* because of its close proximity to the granite hill on the northern side of the village.

On approaching the village, towards the north is the castellated granite hill, atop of which is a temple of recent origin dedicated to Goddess Chamundesvari which enshrines a group of *Sapta-matrikas* of considerable antiquity. At the foot of the hill is another temple of Munisvara depicted in the form of a nude male figure shown in a lying posture. He is a very popular God in this region, artracting large number of people almost alround the year. Adjacent to this hill on the south is a large mound locally called *Sirimanninadibba* (Mound of the rich soil) which represents the ancient settlement (Pl. I). The site originally covered an area of 300 mX600 m. A part of the present village including the Government School building and the Janata Housing Colony stand on the site itself. The eastern periphery of the mound had been severely dug up to accommodate the housing colony and the resultant steep cutting (Pl. II) had clearly revealed a four-fold cultural sequence with a total deposit of about 6.5 metres.

In addition to the vast mound, there are innumerable rock shelters in the hill overlooking the terrace and the mound, which possess undisturbed ancient habitation deposit. A series of such rock shelters can be seen on either side of the steps leading to the Chamundesvari temple on the hill. These shelters are formed out of large overhanging cliffs or by several huge boulders resulting in a cave like formation, the access to the latter being sometimes through a small opening. Some of them are very large in size measuring 10X5m raising upto a height of 3 m. To the west of this group are a few more rock shelters.

One of the shelters, immediately above the mound but slightly towards west, consisted of habitation deposit of ashy nature (Pl. III). Further east, at a short distance of ¾ km. again on the top of the hill is a place locally called *Kudre natta* or *Garnatta* (Pl. IV). Although access to this spot is difficult, at the top is a flat terrace surrounded on all the sides by a series of rock shelters, which possess rich cultural deposits. One of them is below the ground level and one has to duck to enter the cave. Besides occupying these shelters, even small flat terraces found on the slopes of the hill seem to have been utilised for occupational purposes as revealed by the habitation deposit. But the rock shelter yielded large number of Neolithic handmade pottery and lesser number of Megalithic ware. The former includes pale grey ware, with or without pinched lip, with paintings in red ochre, coarse red ware, red slipped ware etc. But the most significant find was the occurrence of a black painted red ware.

During the year 1973-74, following a resurvey of the area by the author (in 1969-70), a trial digging was conducted by the Southern Circle of the Archaeological Survey of India under the guidance of K. V. Soundra Rajan, assisted by the author. A small trench was laid on the southern periphery of the mound. The excavation yielded a two fold cultural sequence in which the earlier was represented by pure Neolithic occupation and the latter by Megalithic culture.

In view of the potentiality of the site, its probability of throwing more light on the painted pottery tradition and to know the earliest habitation of the Neolithic people, a large scale excavation was undertaken during the year 1983-84 (Pl. V). As far as the results are concerned, the present excavation proved to be highly significant as, besides confirming the previous, results it brought to light the presence of two more cultural periods which had not been encountered in the trial digging.

The excavation yielded a four-fold cultural sequence as follows :

Period I Neolithic
II Neolithic-Megalithic
III Megalithic
IV Early Historical

Period I, Neolithic was mainly characterised by the remains of pottery represented by well burnished buff, red and grey ware, last one frequently having a post-firing ochre colour painting on the rim portion. The percentage of burnished greyware was higher in the later phase than in the earlier phase which was dominated by unburnished grey ware. The significant aspect however being the black-on-red ware in this period. Since the area excavated at this level was too small, no comprehensive house plans could be traced. But in the later phase of this period, pot sherds of thick coarse-red variety were used for preparing the floors. Another important discovery was that of a potter's kiln, only the peripheral portions of which could be exposed. As regards the lithic appendage (especially Microliths), only a few microlithic cores were encountered. Other antiquities include stone implements like celts, rubbers, bone tools-charred and polished (stylus ?) etc.

Period II was the period of overlapping between the Neolithic and Megalithic cultures. The occurrence of Megalithic ware gradually increased from the lower levels to the upper levels. The ceramic industry is mainly characterised by coarse red ware, buff ware, grey ware, black-and-red ware, black ware, etc. The burnished grey ware with post firing ochre painting continue to appear in this phase also. The types are dominated by bowls.

In the upper levels of this period a rare feature like burying the dead inside the habitation was noticed : a chalcolithic trait practiced probably due to influence (Plate VI). The burials are grouped in a place though isolated ones were also exposed. Generally oriented in the North-South direction, few of them have a slight tilt towards East, with head facing North, these burials were provided with a lithic appendage in the form of either a heap of cairn or slab dressings. Two of the burials exposed so far revealed an extended pit inhumation. Both of them were provided with burial furniture like spouted vessels and bowls. This evidence is important to show that the chalcolithic people adopted some of the burial customs of the megalithic folk. It is noteworthy that the burials of the same period at Ramapuram, District Kurnool (AP) have also shown remarkably similar features. Another important feature of this phase is the intensive structural activity. A large circular house, located in the centre of the mound was exposed. It measured 6 m in diameter and was provided with a ridge, a strongly prepared platform with a well laid-out pot sherds forming an exterior apron.

Period III, Megalithic, yielded a ceramic industry comprising Black-and-Red ware all black ware, and red ware. The fabric is thin and made of fine levigated clay and well fired. The types include bowls, jars, shallow dishes, knobbed lids, etc. The settlement pattern was in the form of well prepared floors, mostly circular in plan, with post holes (Pl. VII). Other antiquities encountered in this period are iron objects like dagger, arrow-heads, spearheads, knife, beads of stone and shell, etc.

The early historic period was represented by black-and-red ware, red ware including the painted variety which is commonly called Russet Coated ware or Andhra ware. The paintings are generally made on black-and-red ware with Kaolin, and the decorations include small wavy lines in vertical rows, groups of short thick vertical strokes, thin parallel bands, dotted lines, etc. Remains of circular and rectangular house plans with post-holes were encountered. The floors were generally prepared of red murram well rammed with clay. However, the most significant structural remains that was encountered in the early phase was a huge rubble structure resembling roughly a rectangle with a massive retaining wall on the southern periphery of the mound running in south-southeast and north-northeast direction. The retaining wall had three courses of rubble laid in three to four rows with a few huge natural boulders scattered in between. The purpose of constructing this retaining wall was perhaps to check the erosion. Among other antiquities encountered, mention may be made of varieties of beads such as micro, barrel shaped, circular, tubular, disc shaped, *amalaka*–type made on shell, terracotta, glass and semi-precious stones like coral and quartz; ear-rings, ivory dice, terracotta burnishers, shell bangles in various stages of manufacturing. But the discovery of a terracotta chain, perhaps for the first time, deserves special mention. The chain has four ovalish links made on grey ware and was probably used as a toy.

Thus the evidence obtained from the excavation at the site and exploration in nearby rock-shelters is significant from several aspects. In the first instance, the question whether the painted pottery tradition extended into this region was confirmed by the discovery of black-on-red ware from the early phase. It can be recalled here that the exploration around Patapadu in Kurnool district by I. K. Sharma had revealed a separate painted pottery tradition along with limited burnished grey ware, the former akin to that of Malwa ware which the author attributed to 'inter-regional development due to external stimuli and placed on par with the early phase of Navdatoli, Nagda and Eran'. He also opined that the painted pottery community continued to live in rock shelter castellated hills but sooner moved to the plains commanding cultivable tracts. Further, a trial digging at Singanpalle (District Kurnool) by S. R. Rao in 1967-68 revealed that the early settlers of this region preferred cultivable fields in place of castellated hills, bringing into existence large village settlements, and had adopted the post Harappan tradition of painting the pottery. These evidences pointed towards the existence of a separate painted culture influenced by the Chalcolithic elements in this region, having Kurnool and Cuddapah as the nuclear regions.

The black–on-red ware sherds encountered at Banahalli are too fragmentary to determine the shapes. The pottery is clearly wheel thrown with a medium fabric, light red in colour and is comparatively well burnt. Its occurrence in the early phase of period I do indicate the intrusion of a painted pottery tradition in this region for the first time and can be considered as the southern-most extension having this tradition. It can also be presumed that switching over of settlement from rock shelters to the open air plains had taken place at the same time.

As regards the dating of the Neolithic period at Banahalli, a tentative date can be fixed by adopting relative dating method. The Neolithic period has yielded burnished grey ware with ochre paintings on the rim, buff ware and coarse red ware. However, the coarse red ware, appearing in huge quantity, is not encountered in regular layers along with other ceramics, but its use seem to be limited to soiling in the preparation of floors in the 17th layer of this period. It is significant, as mentioned earlier, that the rock shelters yield large number of sherds of coarse red ware, and it can be presumed that this red ware pottery used earlier by the Neolithic people living in the shelters might have been brought down by the later settlers, to be used in the preparation of floors. It can be recalled here that the same type of coarse red ware has been encountered in Neolithic sites at Pannimaduvu and Dailmalai in Dharmapuri district, of Tamil Nadu and at Nagarjunakonda in Guntur district of Andhra Pradesh. The Tamil Nadu sites correspond to phase I of the excavator and has been dated around 2500 B.C. which is also the date given by the Nagarjunakonda excavator for the red ware tradition. The second phase of Neolithic culture in Tamil Nadu represented at Togarapalli in Dharmapuri district which has yielded burnished grey ware has been dated around 2100 B.C. or 2200 B. C. On the basis of these computations the beginning of the Neolithic settlement at the present site might have taken place around 2100 B.C.

But further excavations, if done in the rock shelters may throw more light on the red ware and painted pottery tradition in this region and may take back the antiquity of this place to a still earlier period.

Recent explorations in Kolar district have brought to light several Neolithic-cum-Megalithic settlements. They are Arabikothnur, Terahalli, Paparajanahalli in Kolar taluk. All the sites are located either on the slope or on the flat terrace of the hill. The Arabikethnur site has several rock shelters yielding large number of Neolithic hand made pottery such as grey, buff and red wares. Among the shapes encountered, lipped bowl seem to be predominant in number. At Terahalli, the site is situated on a flat terrace with an adjoining rock shelter and this also yielded the same type of Neolithic wares and Megalithic black and Black-and-red wares.

In addition to these, two more sites have been brought to light near Masthi in Malur taluk which are significant for the fact that they are purely factory sites yielding polished stone axes in different stages of manufacture without any ceramic association and this may represent a stage, the type of which has already been noticed in the Kappalavadi hill and Bargur area of District Dharmapuri by Bruce Foote.

A study of all the explored and excavated Neolithic sites in South India reveals that there were three phases of settlements of Neolithic people. In the earlier phase they inhabited the rock shelters and flat terraces on the hill tops which gave them enough protection and enabled them to command a larger area from the top of the hill as at Tekkalakota, Banahalli, Paiyampalli, Shevroy hills, etc. In the second phase although they continued to live in rock shelters, they also came down to the foot of the hills and plains. While in the third, they preferred the river banks as at Hallur, T. Narsipur and Hemmige. This shift in the settlement pattern particularly from the hill top to the plains was mainly bacause they could overcome the fear complex which had forced them to stay at the top and had gained enough confidence to come down to the plains. Increase in the size of settlement, improvement in the economy resulting from a more highly organised agricultural society are some of the other factors which necessitated this change in the pattern of settlement. At Banahalli, we have settlements corresponding to the earlier two phases and a simultaneous excavation in these places will enable to know more about their cultural traits particularly with regard to the introduction and innovation of ceramic tradition and their relation with settlement pattern

Here, a word about Megalithic burials will not be out of context. At Banahalli, we have the habitational as well as burial sites, the latter representing three types at the same place. These are stone circles with cists, menhirs and dolmens. The cist is east-west oriented and the post-hole provided in the eastern orthostat. The orthostats of the chambers are arranged in anti-clockwise swastika pattern. The cists are very big and covered by a huge capstone. There are about one hundred burials in this area and are situated to south of the village (Pl. VIII). Since the only site subjected to excavation in this region is Jadigenahalli, further excavation of the burials mentioned above will throw more light on the burial tradition of this place *vis-a-vis* the Megalithic habitation.

An interesting Megalithic burial site is brought to light at a place called '*Manchakallu*' which is situated at a distance of about 5 kms to the south-east of Banahalli village.

The burials are situated on a hillock known as "*Pandavaragudi*" Betta, which is about 100 metres high (Pl. VII). On the flat top of the hillock, there are about one hundred and fifty cist burials and almost all of them have more than one concentric circle around them. A few have more than five circles, the intervening space being filled with rubble thereby resembling a dry stone wall. The height of the outermost circle is shorter but increases inwards. Generally, they have a port-hole cist with four orthostats arranged in swastika pattern, surmounted by a huge capstone. Though these types are not met elsewhere in this region, they can be however compared with a similar group of burials near Kadiriraya Cheruvu village in Vayalpad taluk, district Chittor, Andhra Pradesh.

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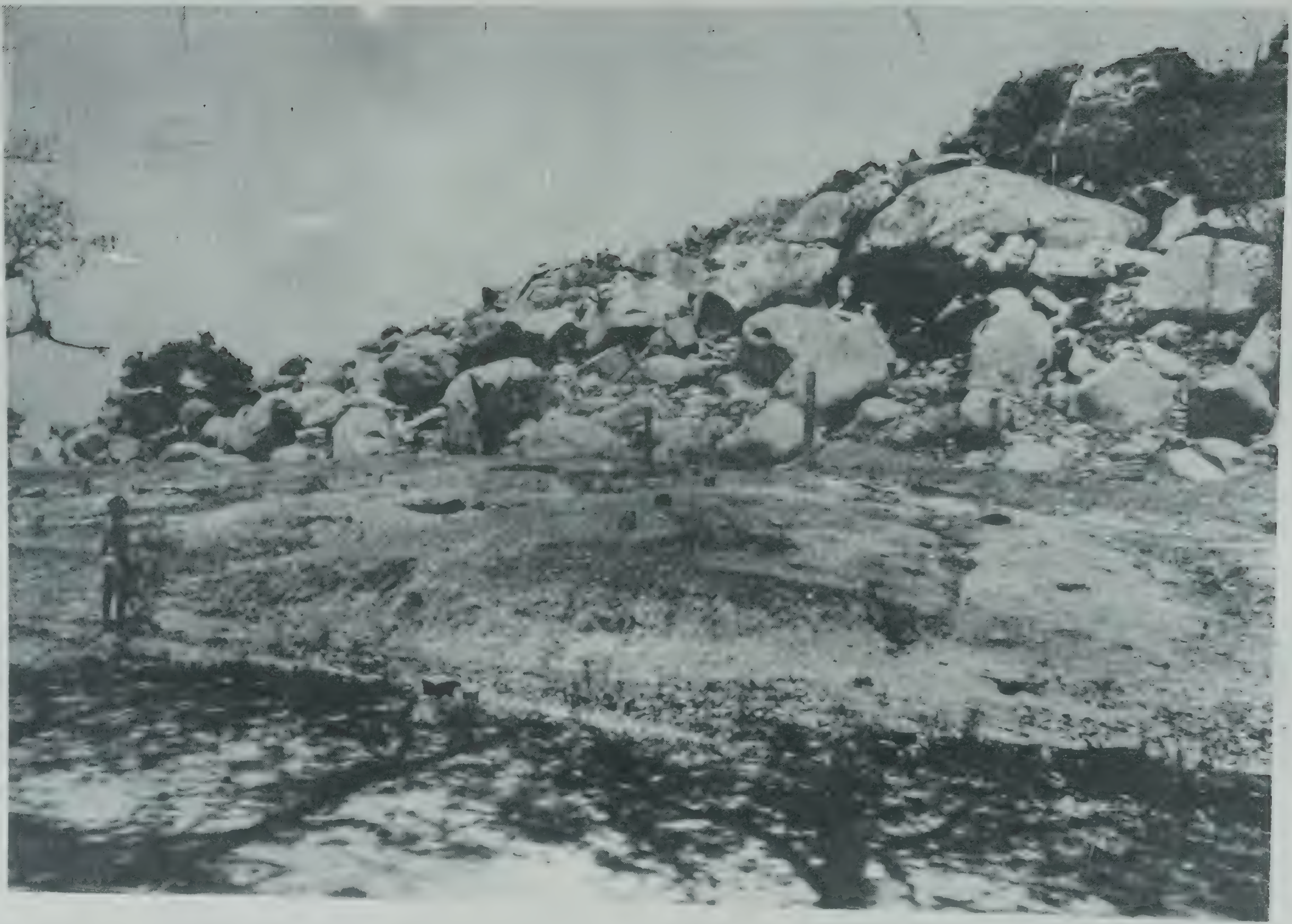
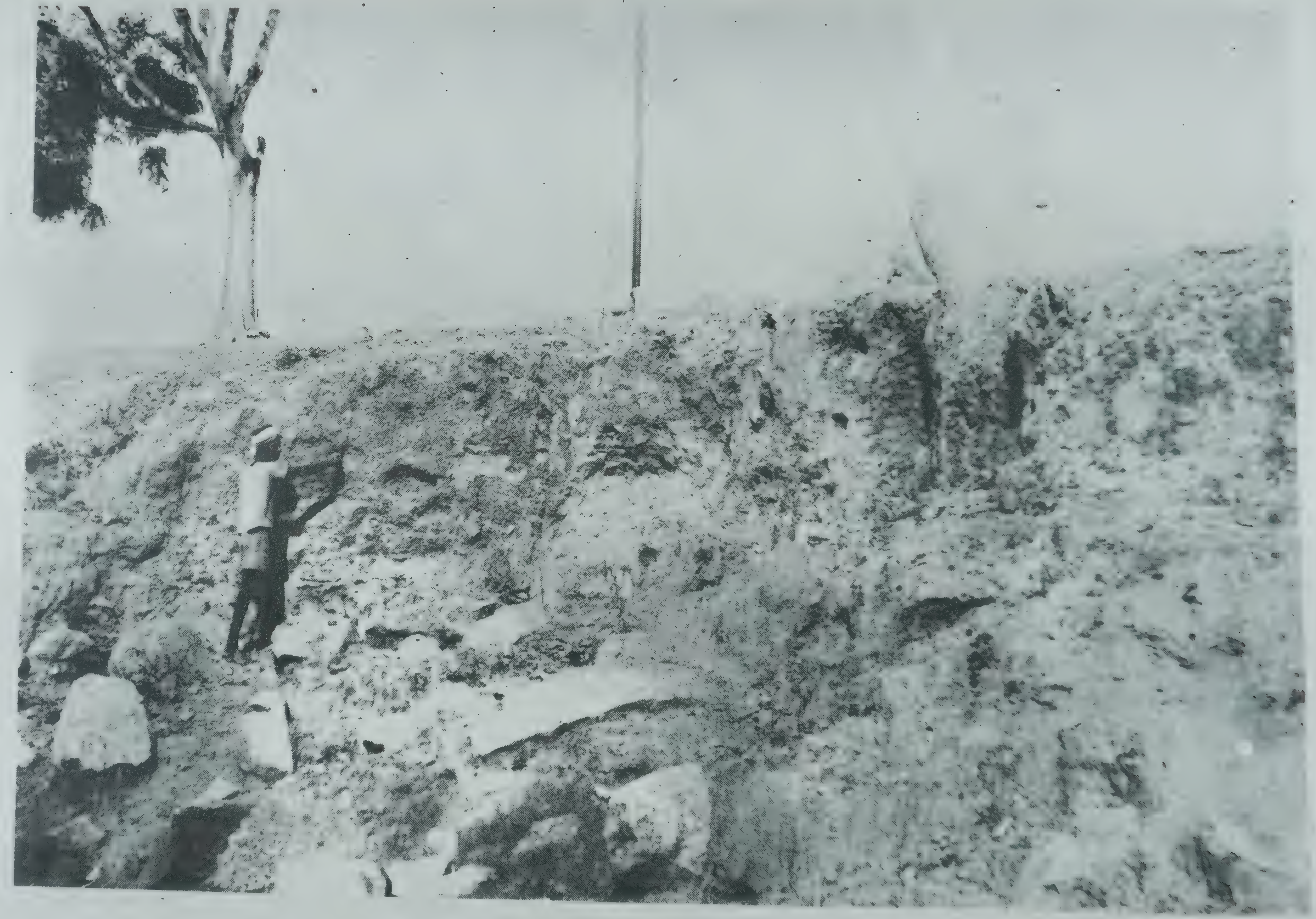
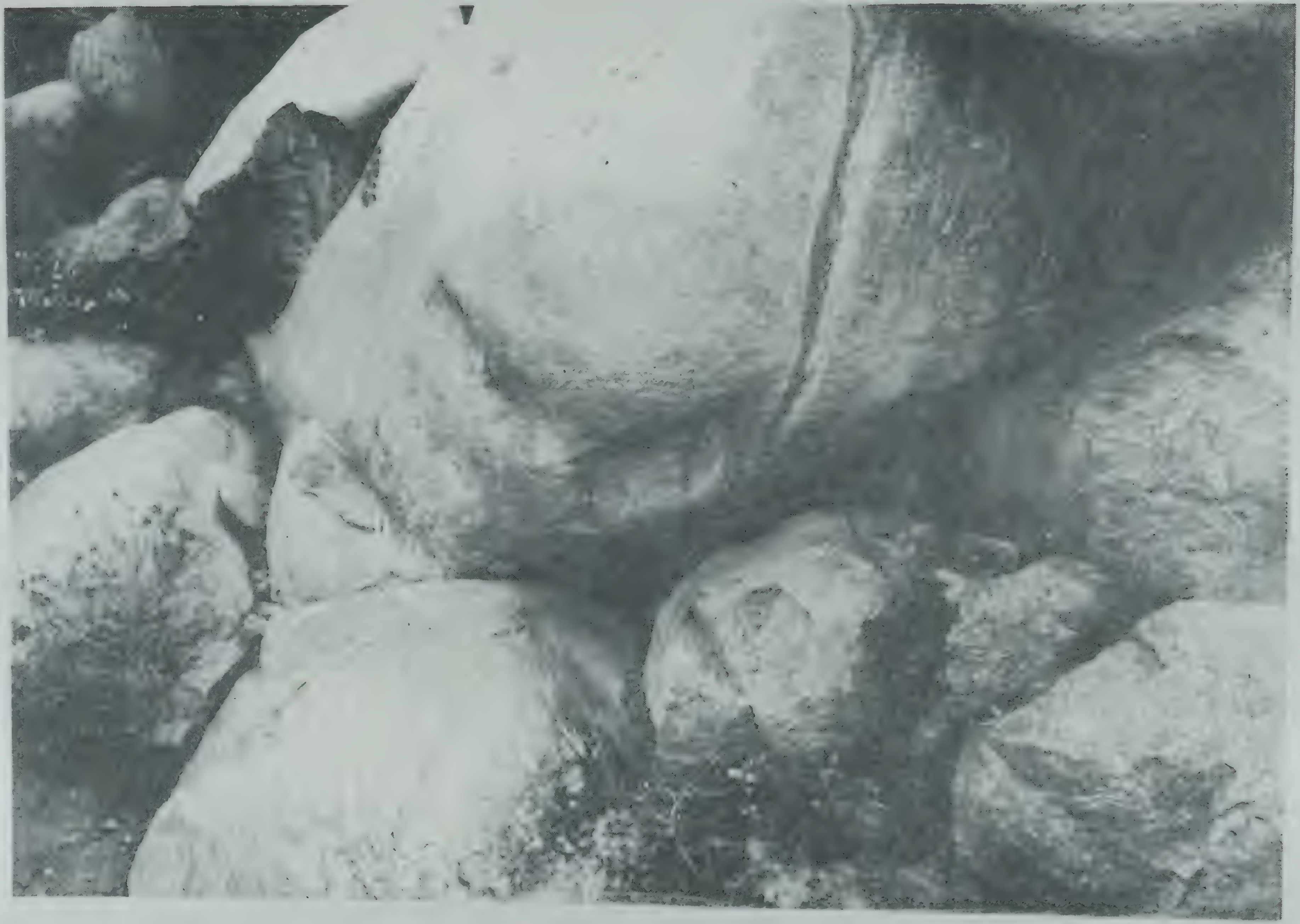


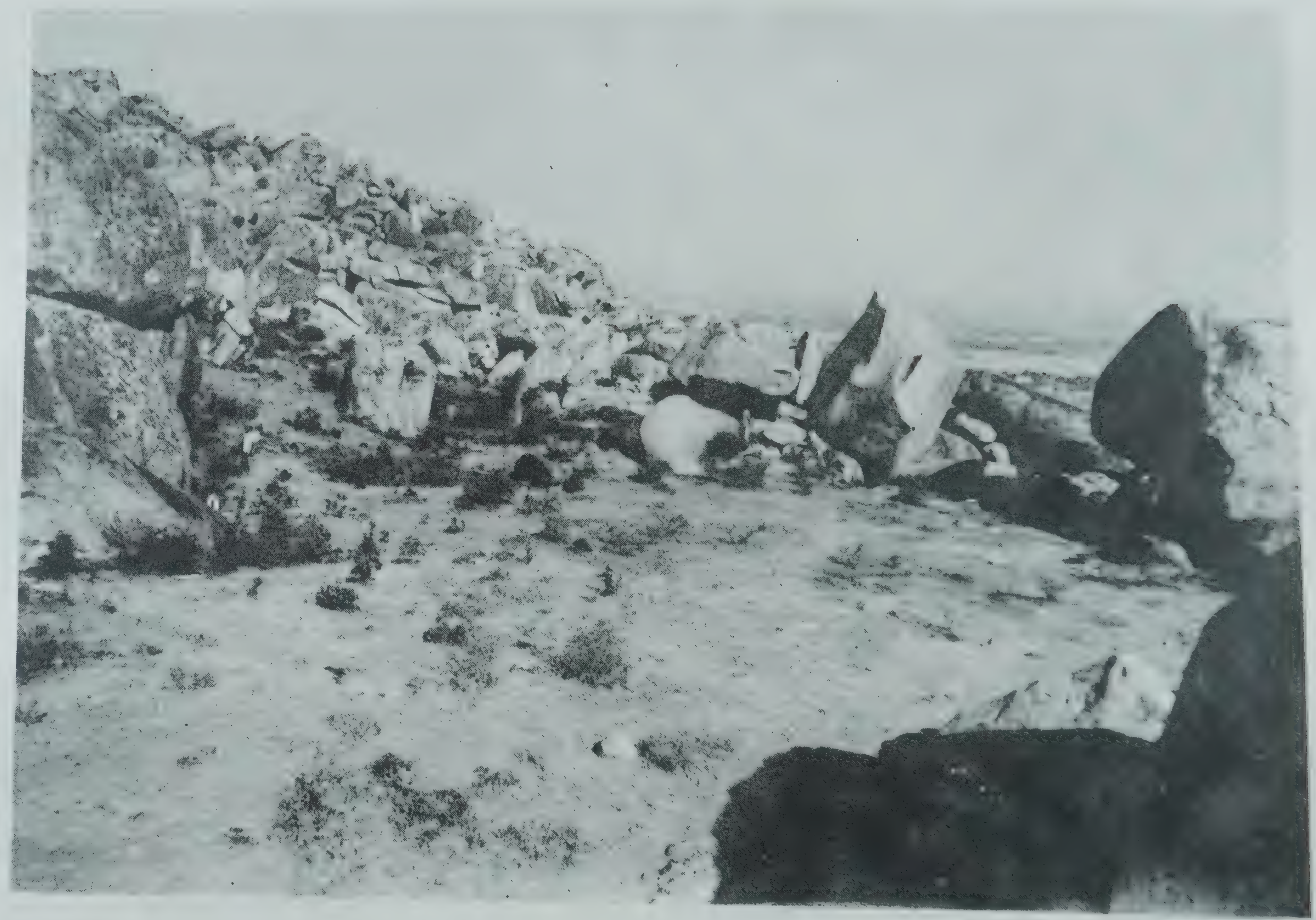
Pl. I General view of the habitation site, South view, Banahalli, Malur Taluk, Kolar Dist.



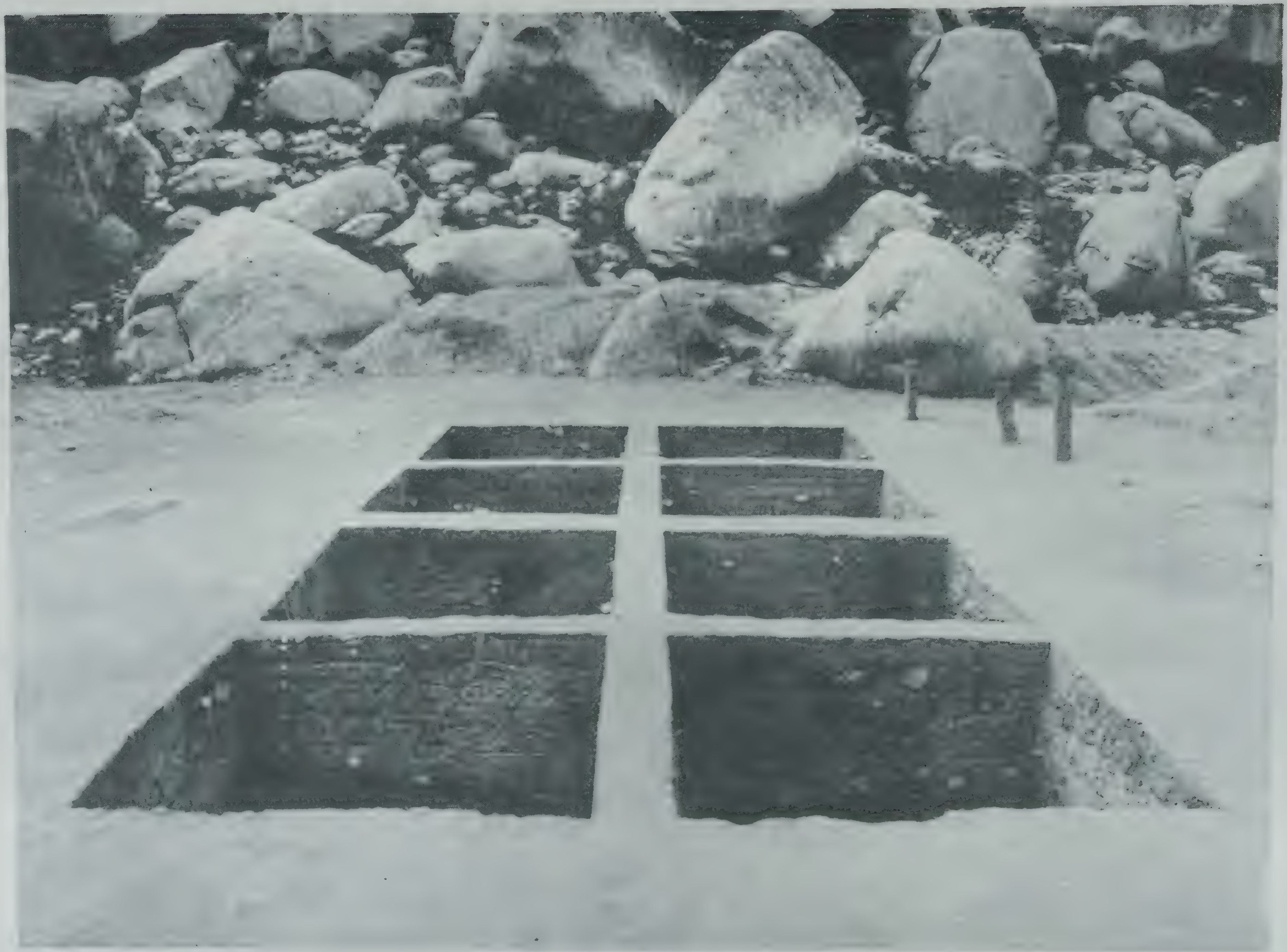
Pl. II General view of the site, East view, (disturbed), Banahalli, Malur Taluk, Kolar Dist.



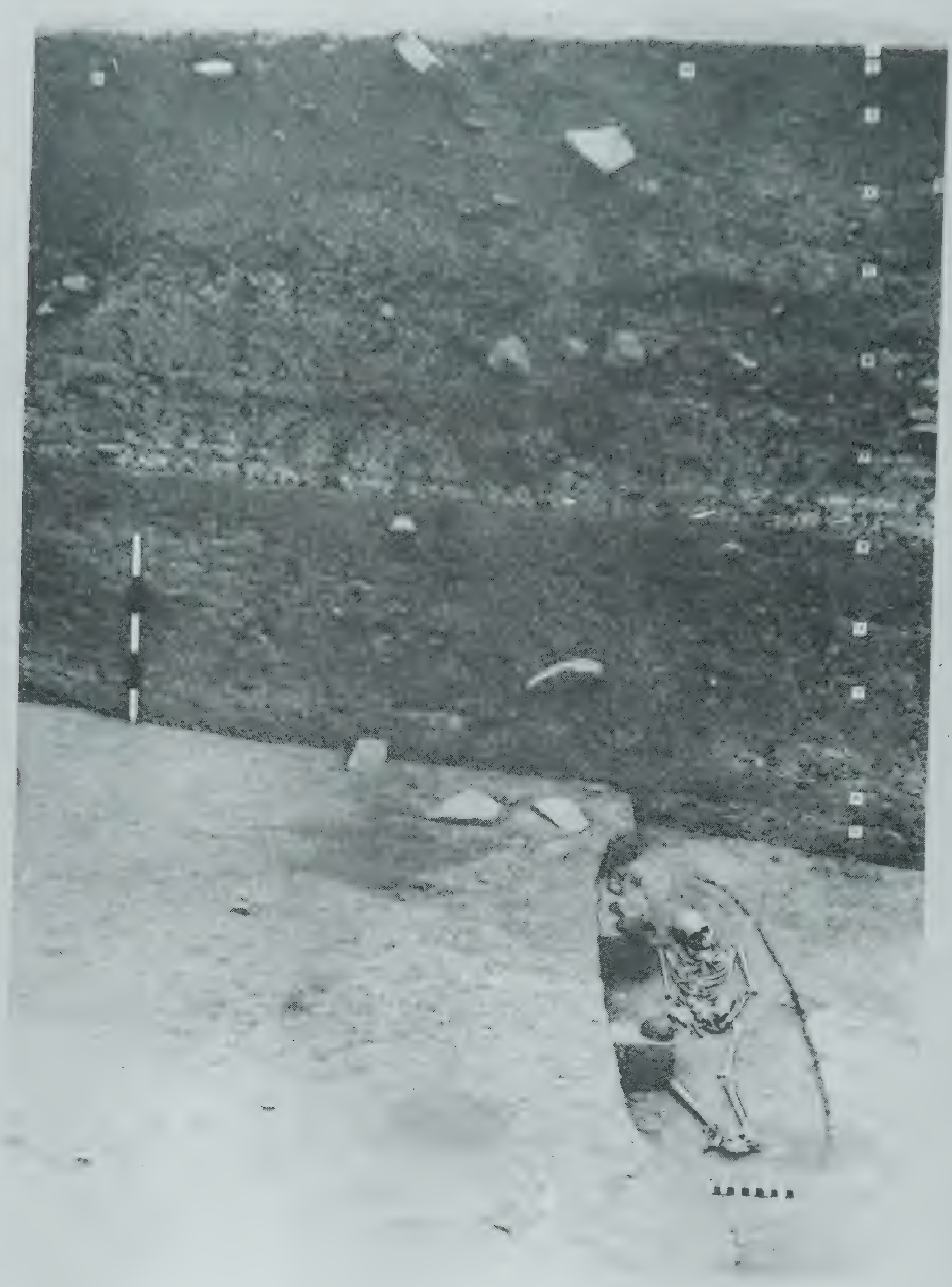
Pl. III General view of the cave shelter, Banahalli, Malur Taluk, Kolar Dist.



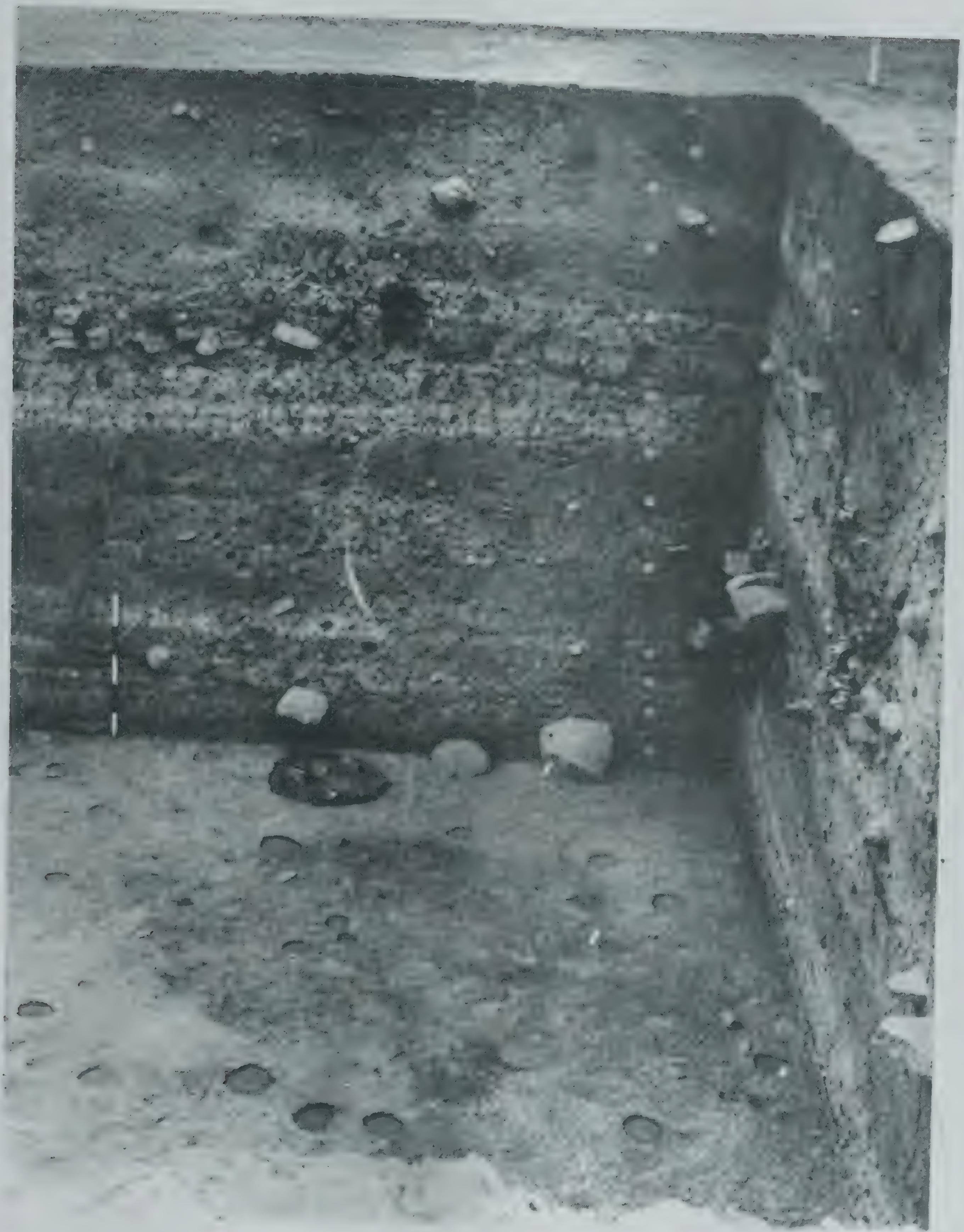
Pl. IV General view of a terrace on the hill, known as Garnatta or Kudurenatta, Banahalli, Malur Taluk, Kolar Dist., Each individual indicates the entrance of the cave shelter.



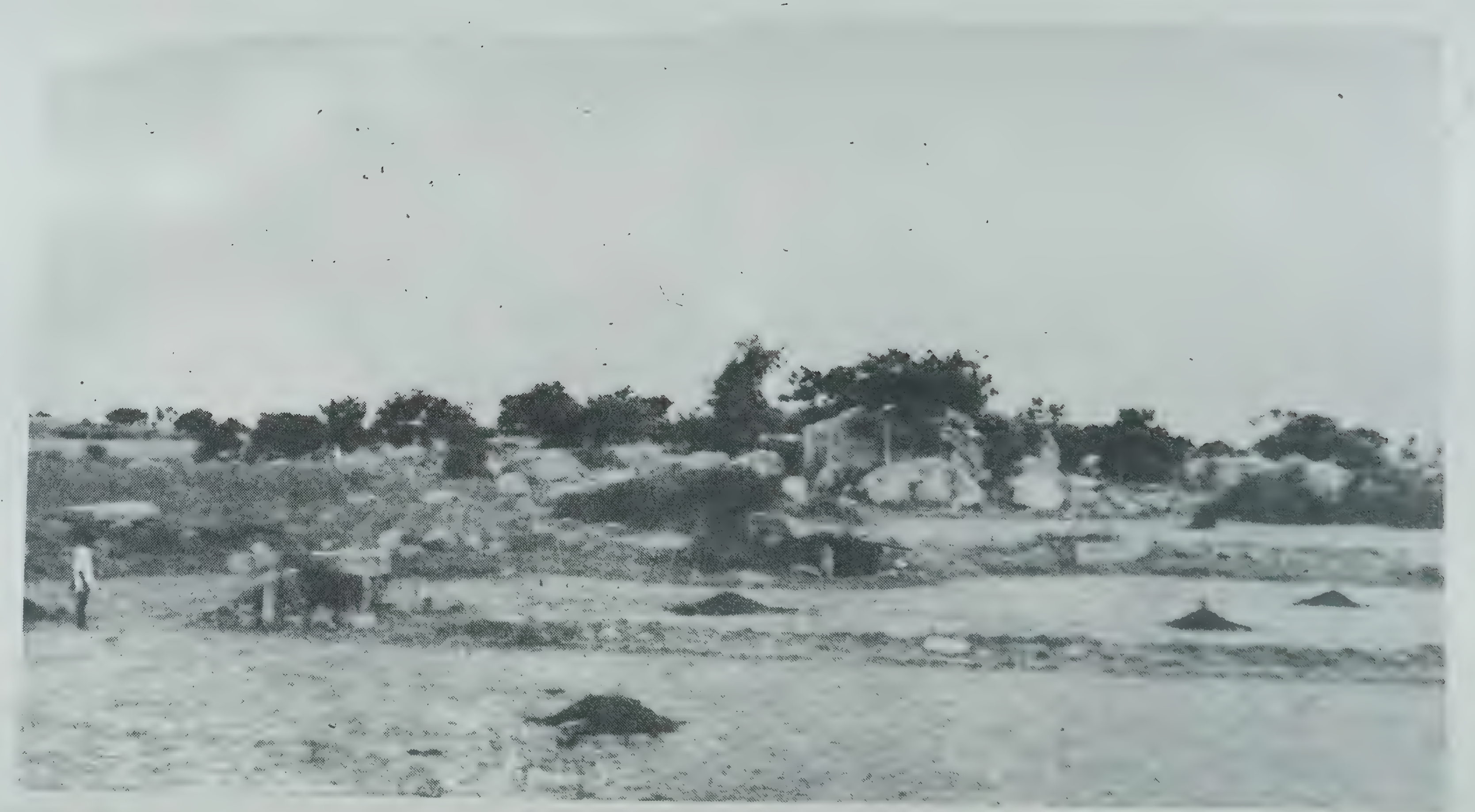
Pl. V General view of the excavation, Banahalli, Malur Taluk, Kolar Dist.



Pl. VI General view of the Burial, Banahalli, Malur Taluk, Kolar Dist.



Pl. VII Plan of a circular structure with post holes, Banahalli, Malur Taluk, Kolar Dist.



Pl. VIII General view of the megalithic burials, Banahalli, Malur Taluk, Kolar Dist.

10. A NEOLITHIC AXE FROM ANMOD—A NOTE

K.G. Bhatsoori

Preliminary Remarks

The source materials for the reconstruction of the Pre and Proto historic cultures of any region are exclusively in the form of stone/metal tools and weapons, potteries, burials etc., systematically collected from habitation/camp/burial sites of the Pre-historic people. In Karnataka, the region of the Bhima, Krishna and Tungabhadra has been explored by the Archaeology Department (ARADHA, 1927-28, 1935-36, 1936-37, 1940-41) of the former Hyderabad State and by Subba Rao (1948) and Allchin (1960). The regions of the entire Tungabhadra and Shorapur Doab have been explored by Dr. Nagaraja Rao (1966) and Dr. Paddaya (1968) respectively. As a result, Neolithic cultural phase has been brought to light. Between 1964-67 the Ghataprabha and the Upper Krishna valleys have been explored by Dr. A. Sundara (1971, p. 13) from which it can be surmised that natural resources must have been very hospitable to neolithic man. Thus in almost all the river valleys of upland Karnataka, numerous prehistoric sites have been discovered.

However, in coastal Karnataka, no neolithic sites have so far been traced. Perhaps this situation is due to the lack of sufficient and thorough field explorations in this part. No doubt R. V. Joshi, S. N. Rajaguru and R. S. Pappu, have carried out explorations in the coastal areas, around Gokarna and Kumta (IAR, 1972-73, p. 25) in Uttara Kannada. As a result of which a few mesolithic sites were discovered. At Honnavar near the Siva temple, a stone axe was noticed by the South Western Circle, Archaeological Survey of India under the direction of S.R. Rao and A. Sundara (IAR, 1968-69 p. 24). But the latter opines that the speciman does not have clearly the characteristics of an axe. These discoveries vaguely indicate the possibility of existence of stone age cultural sites in the Uttara Kannada region.

Discovery of a Neolith

The Directorate of Archaeology and Museums in Karnataka undertook exploration work in the Uttara Kannada district in the year 1985-86 during the month of February. During this exploration work carried out by the writer at Anmod, he noticed a neolithic stone tool (Fig. I), for the first time in the Uttara Kannada district.

Locality

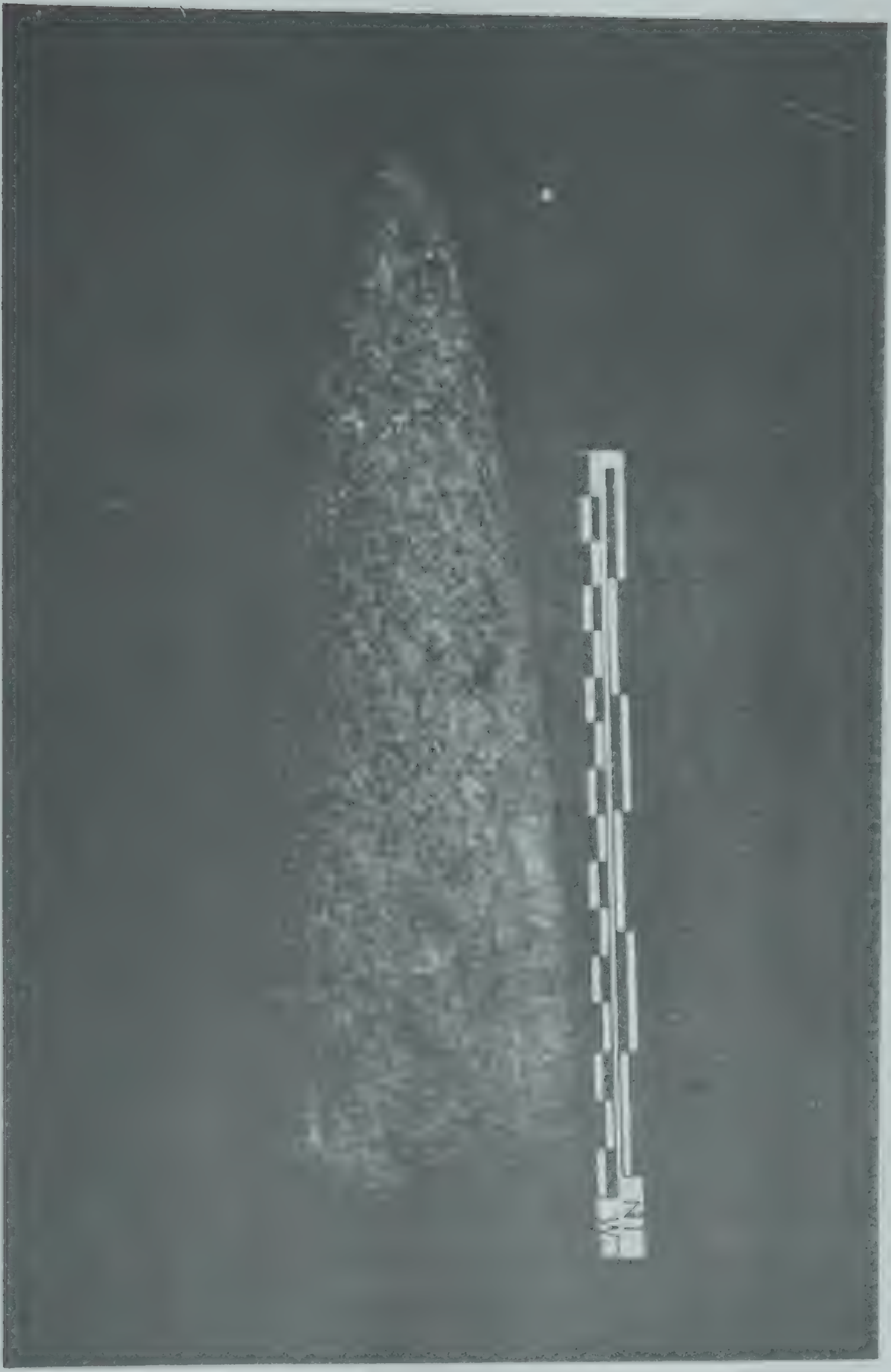
Anmod is a village in Joida taluk (formerly Supa was the taluk Headquarter). The neolithic axe was placed in a Siva temple and Devi temple near the hill. Incidentally the Sivalinga and the figure of Mahishasuramardhini in the dilapidated temple, are ascribable to 17th c. A.D.

The stone axe measures 24 Cms. X 7 Cms. X 3 Cms (Plate I). It is elongated, triangular in form and ovoid in section with rounded margin, pointed butt end and crescentic sharp working edge. The edge is slightly flaked off. It is well ground, made out of basalt dyke.

The significance or occurrence of this neolithic axe indicates at least the movement of neolithic people in the evergreen wild forest area, for the first time. However, it is difficult to trace the habitation site, if there be any, because of the thick vegetation growth on the surface. But in view of the fact that the occurrence of neolithic axe even in the early historical context as survival for example – at Vadgaon Madhvpur (Sundara, 1981; pp. 81-97), whether this specimen described here is an indication of the survival as a curio in the subsequent historical context, is to be investigated. It may be recalled here that further northwards in Goa, at Tamdesurla (Sundara A., 1969, pp. 183-203) was found some time ago a butt end of an axe. All these stray occurrences may help in further work and in deciding about their cultural significance. It is in this context that the present find is important.

* * *

I am extremely thankful to Dr. A. Sundara, Director of Archaeology and Museums, for various suggestions in preparing this article and for permitting me to publish this article.



Pl. I Neolithic Axe – Anmod, Joida Taluk, Uttara Kannada Dist., Karnataka

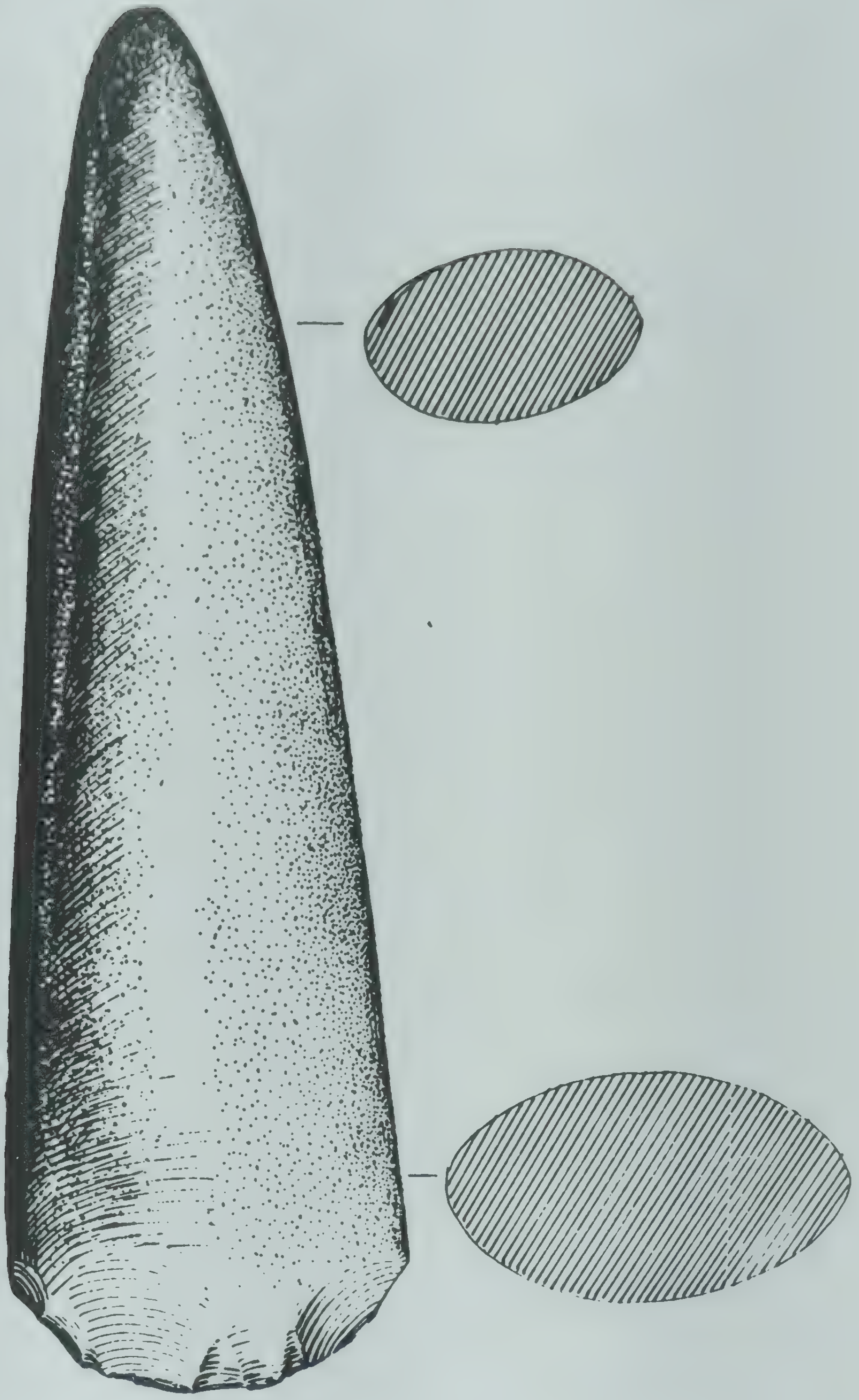


Fig. I Neolithic Axe - Anmod, Joida Taluk, Uttara Kannada Dist-, Karnataka

11. ASHMOUNDS IN SOUTH INDIA : A REVIEW

V. Rami Reddy

INTRODUCTION

Mr. Chairman, ladies and gentlemen, I felt highly honoured when I was invited by Dr. A. Sundara on behalf of the Directorate of Archaeology and Museums in Karnataka, to speak on the 'Ashmounds in Andhra Pradesh : A Study' in this National Seminar organised to celebrate the centenary of the Directorate. On this auspicious and commemorative occasion, I thought it appropriate to widen the scope of the given topic of the present paper from 'Andhra Pradesh state' to the entire 'South India' in view of the nature of the problem which had its roots in Karnataka where the ashmounds were first noticed by Col. Colin Mackenzie followed by T. J. Newbold in North Karnataka about half-a-century before the birth of the Karnataka State Directorate of Archaeology and Museums to carry out this onerous task in an organised and orderly manner.

The ashmounds of our concern, unlike those described for the accumulations of ash of soft powdery variety, are heaps of vitrified ash of various sizes occurring in the form of mounds, their surface often littered with iron slag. These occur as a part of larger phenomenon and are peculiarly confined to South India. They are mainly found distributed in the Bhima-Krishna-Thungabhadra doab covering the districts of Belgaum, Bijapur Gulbarga, Raichur, Bellary, and Chitradurga of Karnataka; and Mahabubnagar, Kurnool and Anantapur of Andhra Pradesh. They have also been reported at the megalithic sites of Kilnattam and Thirthu in the Tinnevelli district of Tamil Nadu (Marshall 1903-04; p. 77). More than sixty of them, including those discovered by me (Rami Reddy 1968, 1969), Sundara (1971; pp. 308-314) and Paddayya (1973) are known so far (Table 1).

II. The Problem and Earlier Hypotheses

The ashmounds, which have been found only in South India so far as our country is concerned, right from their first discovery in the beginning of the last century coeval with the official beginning of the Indian prehistoric and protohistoric Archaeology, posed a problem regarding their origin and chronology. Their study has attracted the attention of some well known archaeologists and geologists, who put forth a number of inconclusive hypotheses of ashmounds ranging from volcanic ash, slag of iron, copper and gold workings to product of human cremations. The local people living in the vicinity of ashmounds too hold fantastic views about their origin. As the ensuing account would show, no convincing explanation has emerged from these hypotheses regarding the origin of the ashmounds.

As already stated, ashmounds were first noticed in the beginning of the 19th century in North Karnataka by Col. Colin Mackenzie, who viewed them as the hillocks of white pebbles or fossil remains. Following this, Captain Newbold (1836 ; pp. 670-671 ; 1843 ; pp. 129-36), out of his keen interest and anxiety in the problem, excavated twice one of the Kupgal ashmounds situated at the foot of Saudamma Hill near Sanganakal village in Bellary district, and concluded, ignoring the excavated evidence, that the mounds were associated with the ancient funerary places. Foote (1887 ; pp. 259-282), who noticed ashmounds during his survey of South India, believed that these resulted due to burning of cowdung by the neolithic

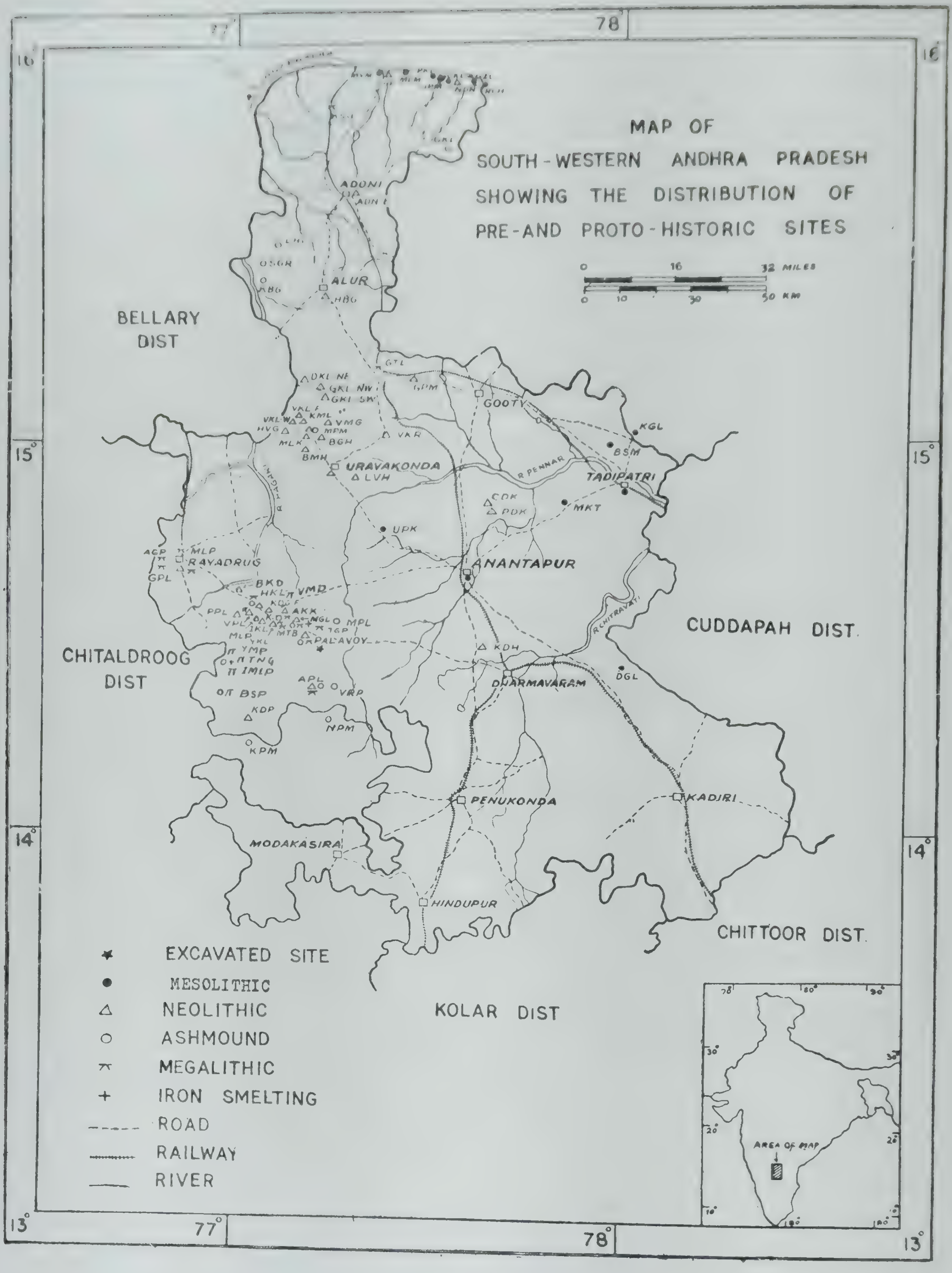

MAP OF
SOUTH-WESTERN ANDHRA PRADESH
SHOWING THE DISTRIBUTION OF
PRE-AND PROTO-HISTORIC SITES
0
16
32 MILES
0
10
30
50 KM
77°
78°
16°
15°
14°
13°
BELLARY DIST
CHITALDROOG DIST
CUDDAPAH DIST.
CHITTOOR DIST.
KOLAR DIST
ADONI
ADN
OSGR
KBG
ALUR
HBG
GTL
GPM
GOOTY
KGL
BSM
TADIPATRI
DKI NE
GKI NW
GKI SW
VKL E
KML
VKL W
HVG
VMG
MPM
MLK
BGH
BMH
VKR
URAVAKONDA
LVH
R PENNAR
R HAGARI
CDK
PDK
MKT
UPK
ANANTAPUR
ACP
MLP
RAYADRUG
GPL
BKD
HKL
VMD
KDG F
PPL
AKK
VPL
NGL
MPL
TGP
YKL
MTB
MLP
PALAVOY
YMP
TNG
IMLP
KDH
R CHITRAVATI
DGL
BSP
APL
VRP
DHARMAVARAM
KDP
NPM
KPM
PENUKONDA
KADIRI
MODAKASIRA
HINDUPUR
EXCAVATED SITE
MESOLITHIC
NEOLITHIC
ASHMOUND
MEGALITHIC
IRON SMELTING
ROAD
RAILWAY
RIVER
80°
90°
30°
20°
10°
AREA OF MAP

Fig. 1

communities, The formation of some of these so called 'cinder camps' according to Foote was comparable to the 'Zeriba Process' prevalent in the East African villages. These observations of Foote have been supported by Hubert Knox and Fred Fawcett following their excavation of one of the Kupgal ashmounds. Sewell (1899 ; pp. 1–16) and Longhurst (1912-13 ; pp. 145-147), who surveyed a number of ashmounds in Bellary district followed by the excavation of the Kudatini ashmound by the latter worker, although agreed with Foote's Zeriba Process, emphasized that they were the outcome of vast funerary holocaust of the medieval times.

Captain Leonard Munn (1927-28 ; p. 27) and his assistants reported at many places stone circles covered around by identical ash and at one place they found a huge stone circle on the top of an ashmound. Munn however did not advance any theory of his own on the origin of ashmounds nor did he agree with any of the earlier hypotheses. Modi (1927–30 ; p. 400), who compared the South Indian ashmounds with similar such mounds in Iran reported by Jackson in 1906 followed by his visit to Lake Urmiah, believed in the existence of cultural contacts in the past between the two countries. Yazdani (1935–36 ; p. 20) held that the ashmounds were the ancient gold and iron-smelting places. Woolley (1940 ; p. 191) conducted chemical tests of iron slag samples from Budikanama and concluded that they were the result of iron workings. Based on these findings he and Dixit supported Yazdani's theory. Subbarao (1949 ; pp. 216-217), inspite of his dissatisfaction with the earlier views, opined that the ashmounds were the outcome of some industrial activity. Zeuner (1959 ; pp. 37-44) on the other hand made laboratory analysis of the ash samples from a number of mounds and concluded that they were of burnt cowdung.

The most recent work on the problem is that of Allchin (1960; pp. 132–133; 1961; pp. 72–75; 1963; p. 15), who not only examined a number of ashmounds but also excavated those at Utnur in Mahabubnagar district of Andhra Pradesh on the basis of the findings of which he inferred that they were the result of ritual burning of cowdung accumulations in the pens by the neolithic pastoral communities. Mujumdar and Rajaguru (1966; pp. 47–49) on the basis of their excavation in the Kupgal ashmound I and laboratory analysis of the ash and slag samples inferred that cowdung was used in the burning and that a temperature of 1250°C was required to change it to a vitrified type. They thus confirmed more or less the views of Foote and Allchin. Paddayya (1973) by his stratigraphical scraping of the Kodekal ashmound in the Shorapur doab supported Allchin's observations.

III. The present study and its methods

It is evident from the preceding account that the problem of ashmounds still continued to remain 'a problem' even after 150 years of its investigation, although for somatime it has been thought to have been solved by the work of Allchin (1963). Therefore the present study was undertaken by the writer (Rami Reddy, 1968; 1969; 1976; 1978) in Andhra Pradesh with reference to its southwestern part situated between 13° 40′ and 15° 58′ N latitude and 76° 50′ and 78° 30′ E. longitude (Fig. I). Stimulated by Allchin's important work on ashmounds and keeping in view all the earlier works, it was decided to investigate the problem of chronology and origin of ashmounds afresh with the following methods of approach :

1. Detailed explorations in the study area for determining as completely as possible the geographical distribution of ashmounds, neolithic settlements, megalithic monuments/settlements, iron ores and ancient iron workings to evaluate their associations to each

other followed by collection of surface finds like antiquities, iron ores and slags and other associated finds.

2. Excavation of a promising site or two to have stratigraphical proof and more archaeological evidence in support of the surface finds.

3. Laboratory analysis and interpretation of the archaeological finds and their associated natural and artificial deposits – ashes, ores and slags – encountered during explorations and excavations.

4. Examination of traditional explanations of ashmounds and to seek archaeological proof for them.

III. 1. Explorations and Distribution Pattern

Our explorations in the Kurnool and Anantapur districts yielded the artifactual and non-artifactual remains at over 75 surface sites belonging to the Mesolithic (14), Neolithic (40) and Megalithic (23) cultures. Beside these, 18 ashmounds and a number of iron-smelting sites have been discovered. Majority of the ashmounds are located in Kalyandrug taluk of Anantapur district usually indicated by the occurrence of iron ore and slag lumps, megalithic tombs or settlements besides neolithic remains, and occasionally by the side of neolithic sites, or in isolation only. This kind of geographical association and distribution pattern of the ashmounds and megalithic monuments at majority of the sites interestingly fits into the distribution pattern of iron ore deposits characteristic of the peninsular gneissic area of Andhra and Karnataka covering the districts of Cuddapah, Kurnool and Anantapur, and Bellary and Tumkur as also Raichur and Gulbarga. In exceptions of sites devoid of iron ores these could have been imported.

2. Excavations and Findings

In order to test the explanations advanced by the earlier workers, particularly those by Allchin, and to corroborate the surface evidence noticed at and collected from a large number of sites in our region, the writer carried out excavations at the site of Palavoy, which is about two kilometers to the east of the village of the same name (14° 30′ N. latitude and 77° 10′ E. longitude) all along the western foot of a huge and long granite hill; the village lies about eight kilometers to the southeast of Kalyandrug town on the right side of Kalyandrug-Darmavaram road in Anantapur district (Fig. II). The site, quite a well-preserved one, is characterised by four ashmounds of unequal dimensions (Ashmound I; 83.05 X 76.20 X 6 m., II: 80 X 70 X 5 m., III: 8 X 8 X 0 m., IV: 50 X 47 X 4 m.), a large number of megalithic monuments such as menhirs, cists, stone circles etc., and several neolithic habitation deposits in different localities. The hill-top is also covered by a number of neolithic settlements surrounded by rock-shelters and stone alignments.

The excavation was mainly conducted on ashmound I by taking two trenches (Trench 1: 8 X 3 m., 2: 26 X 2 m.). Four more trenches, two each, were dug on ashmound II (Trench 1: 12 X 2.5 m., 2 : 9 X 2 m.) and in the habitation areas (I: 6 X 2 m., II: 3 X 2m) devoid of ash deposits on a limited scale to check the stratigraphy and cultural sequence in ashmound I. A sequence of 14 layers divisible into three cultural periods was encountered: Palavoy I or Pre-Neolithic Period, Palavoy II or Neolithic Period and Palavoy III or Post-Neolithic Period (Plate, I). The Pre-Neolithic period, represented by layer 14 of reddish brown murum of 60-65 cm thickness, is characterised by the deeply painted basaltic flake, and blade and microlithic industries. Layers 12 and 13 are sterile separating this period from the Neo-

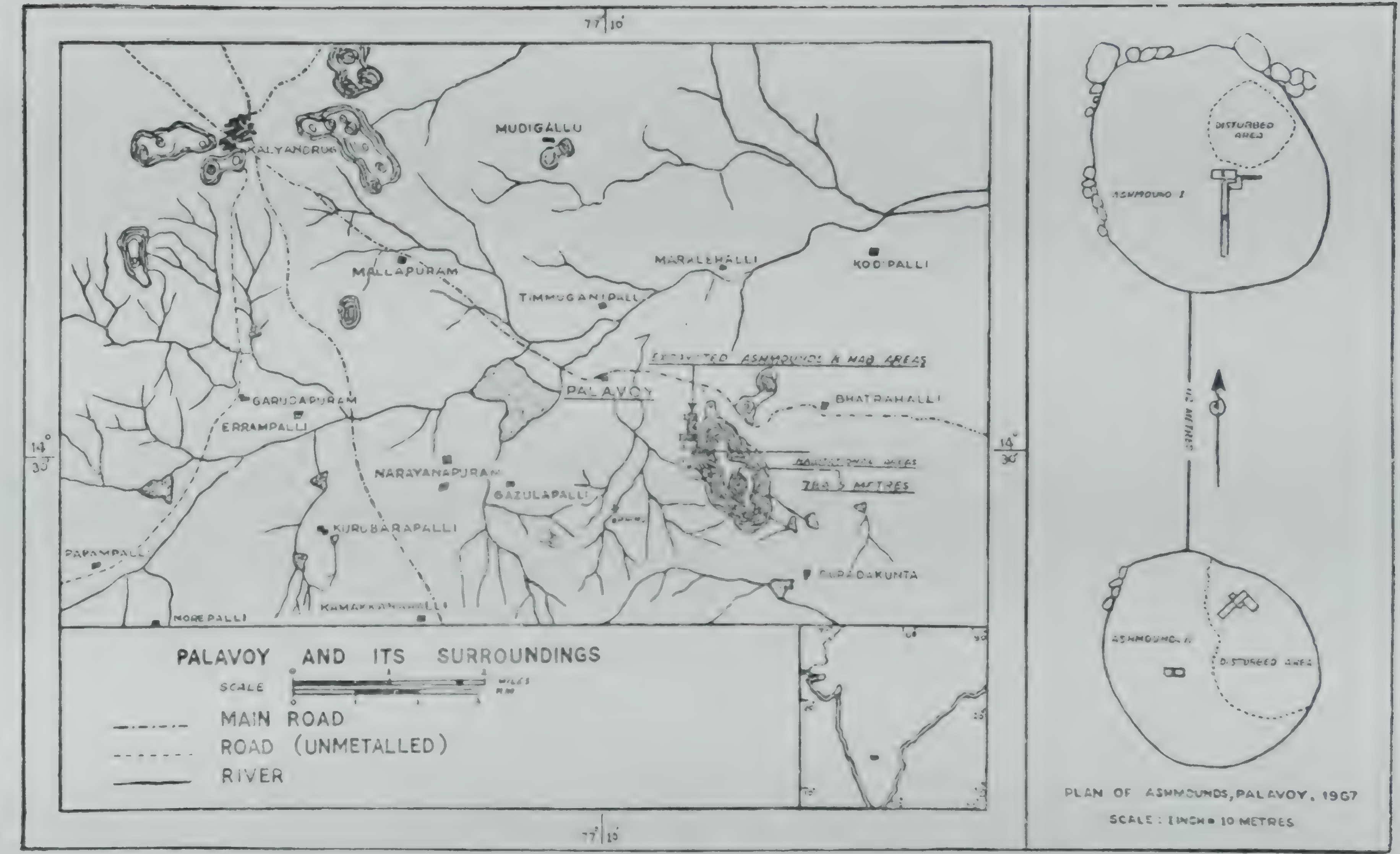

77°10'
77°15'
14° 35'
14° 30'
MUDIGALLU
KALYANDRUG
MALLAPURAM
TIMMUGANIPALLI
MARALEHALLI
KODIPALLI
PALAVOY
EXCAVATED ASHMOUNDS & HAB AREAS
BHATRAHALLI
784.5 METRES
GARUDAPURAM
ERRAMPALLI
NARAYANAPURAM
GAZULAPALLI
KURUBARAPALLI
PAPAMPALLI
MOREPALLI
KAMAKKANAHALLI
DURADAKUNTA
PALAVOY AND ITS SURROUNDINGS
SCALE
MILES
KM
MAIN ROAD
ROAD (UNMETALLED)
RIVER
DISTURBED AREA
ASHMOUND I
112 METRES
ASHMOUND II
DISTURBED AREA
PLAN OF ASHMOUNDS, PALAVOY, 1967
SCALE: 1 INCH = 10 METRES

Fig. 11

lithic period, the evidence of which was found in layers 11 to 9 ranging in thickness from 20 to 120 cm. We have a fairly convincing picture of the life and culture of the people of the Neolithic period and its many-sided technological and economic development is closely comparable to that from other areas of South India. Judging from the single radiocarbon date (1965 ± 105 B.C) for the late level, the thickness of the deposit, and the nature of evidence from the early level, the Neolithic people might have first appeared on this site sometime in the middle of the third millennium B.C. The Post-Neolithic period, which is our present concern, is known from layers 8 to 2 in trenches 1 and 2 of mound I, layer 2 of trench 1 and layers 2 to 4 of trench 2 both of mound II; the thickness of the deposit ranging from 0.52 in mound II trenches to 2.70 meters in mound I trenches.

The Palavoy cultural stratigraphy is comparable to that noticed at Utnur in Mahbubnagar district of Andhra Pradesh, and Kupgal and Kodekal in Bellary and Gulbarga districts of Karnataka or at other sites, but the vitrified ash deposits designated as Palavoy III, unlike at the latter sites yielded megalithic pottery, iron ore and slag lumps, and two iron implements in view of which this period has been taken as a separate cultural stage. The megalithic pottery which occurred more predominantly than the neolithic pottery (Table 2) consists of wheelmade burnished black ware, black-and-red ware, red ware and chocolate-slipped ware (Rami Reddy, 1976; Fig. 24, Nos. 1-16.) Red ware is the most common ware. The potsherds being fragmentary did not give shapes. Perhaps the stratified deposits of this period were not meant for occupation. However from the surface pottery, shapes can be recounted. They consist of bowls, widemouthed pots, dishes, neckless carinated pots, pots with short concave constricted or funnel-shaped neck and basins. The wares as also the pot types are closely similar to those from the surface of many sites in the region. In this connection it may be mentioned that the ash deposits at Kupgal also yielded some megalithic potsherds to the excavators (Mujumdar and Rajaguru ; 1966, p. 17). The iron implements (Rami Reddy ; 1976, Fig. II, Nos. 9 and 12 ; Plate 9, No. 4) consist of a crudely hammered nail and a ring, besides a few stone objects of rubbers and hammer stones of neolithic character. The people domesticated cattle, and sheep and goats like their neolithic predecessors. The charred condition of the bones and the marks of cutting, splitting or chopping reveal the use of sharper instruments like those of iron instead of stone ones for the removal of the enclosed marrow according to Prof. Alur who examined the bones. The cattle were used not only for milk and beef but also for agricultural activities, and the people were undoubtedly advanced agriculturists (Table 3). The iron ore and slag lumps recovered from the ash deposits of Palavoy excavations have been subjected to laboratory analysis which showed the presence of iron to a considerable extent.

This period has two radiocarbon dates : one is 1540 ± 100 B.C. obtained on a carbonaceous ash sample from the earliest or first vitrified ash deposits (layer 7) at a depth of 3—meters, and the other is modern measured on a similar sample of carbonaceous ash from similar but second or final vitrified ash deposits of layer 2 at a depth of one meter. These dates, though appear to be enigmatic and archaeologically untenable at present, are certainly unique in view of the fact that the vitrified ash deposits from at least one site like ours could be dated by C_{14} method which was not possible in the case of earlier excavated sites.

The other aspects that merit our consideration in the study of the ashmound problem are the motives behind the large scale burning of cowdung in a systematic and planned manner at as high a temperature as 1250°C and the mechanisms and processes involved in the vitrification of the ash deposits. The evidence of seven deliberately made floors of soft greyish and loose gravelly earth deposits with many postholes occurred between the two vitrified ash layers, the purpose of which can only be guessed in the light of the archaeological evidence. Our observations on the nature and arrangement of vitrified ash lumps and the occurrence of numerous quartz grains in them led us to believe that mere burning of cowdung at high temperatures would not result in its vitrification. The answer to this was sought by our finding of a vitrified ash lump similar to that of ashmounds near a limekiln belonging to a Sugali of Palavoy village who described the process of lime-making and said that vitrificarion of dung takes place by the addition of cactus (milk hedge) twigs besides tamarind bark, and quartz and feldspar pieces. This was followed by our field experiment conducted on these lines which confirmed that the addition of green, semi-green and dried cactus twigs besides quartz/feldspar grains to the burning cowdung results in high temperature causing its vitrificaiion.

3. Traditional Explanation and Ashmounds and Place Names

There are two kinds of traditional explanations on the origin of ashmounds prevalent in our region. According to one, ashmounds have resulted due to the burning of Hidimbasura killed by the Pandavas. The other story considers the ashmounds as the ancient iron-smelting places. The first story has no archaeological proof, whereas with regard to the second one, even some places like Kolimipalyam in Karnataka (meaning *'Smelting furnace'*) which yielded iron ore and slag pieces, named after these mounds truly reflect their existence and association and archaeologically relevant.

Some scholars like Allchin (1963 ; pp. 90-91) attempted to show interrelationship between the names of the places containing the element 'budi' and existence of ashmounds with special reference to Anantapur district. The writer went into this aspect of analogy by visiting some places linked with the 'budi' element such as Budigumma, about 25 km. northeast of Kalyandrug town ; Budikonda, about 9 km. northwest of Kalyandrug ; and Budagavi Hill, about 55 km. northwest of Anantapur town on the high road to Bellary. The first one is a historical site and the other two are neolithic sites, all the three devoid of ashmounds. There are budi-bearing place names in Karnataka too such as Budihaldon in Sindgi taluk of Bijapur district and Budinal in Shorapur taluk of Gulbarga district, both without ashmounds. These examples clearly show that place names have no relation to the ashmounds or their existence, although the occurrence of ashmounds at some such places cannot be ruled out or vice-versa. Similar explanations can be advanced not only for our region but also for other regions in South India.

IV. Discussion and Conclusion

The ashmounds so far discovered are mainly found distributed in the southwestern part of Andhra Pradesh and in the north-northwestern-northeastern parts of Karnataka covered by the Bhima-Krishna-Tungabhadra doab in the centre of peninsular India. This kind of spatial dIstribution indicates the movement and activity of the ashmound folk from the northwestern to the southeastern direction of South India. The traditional

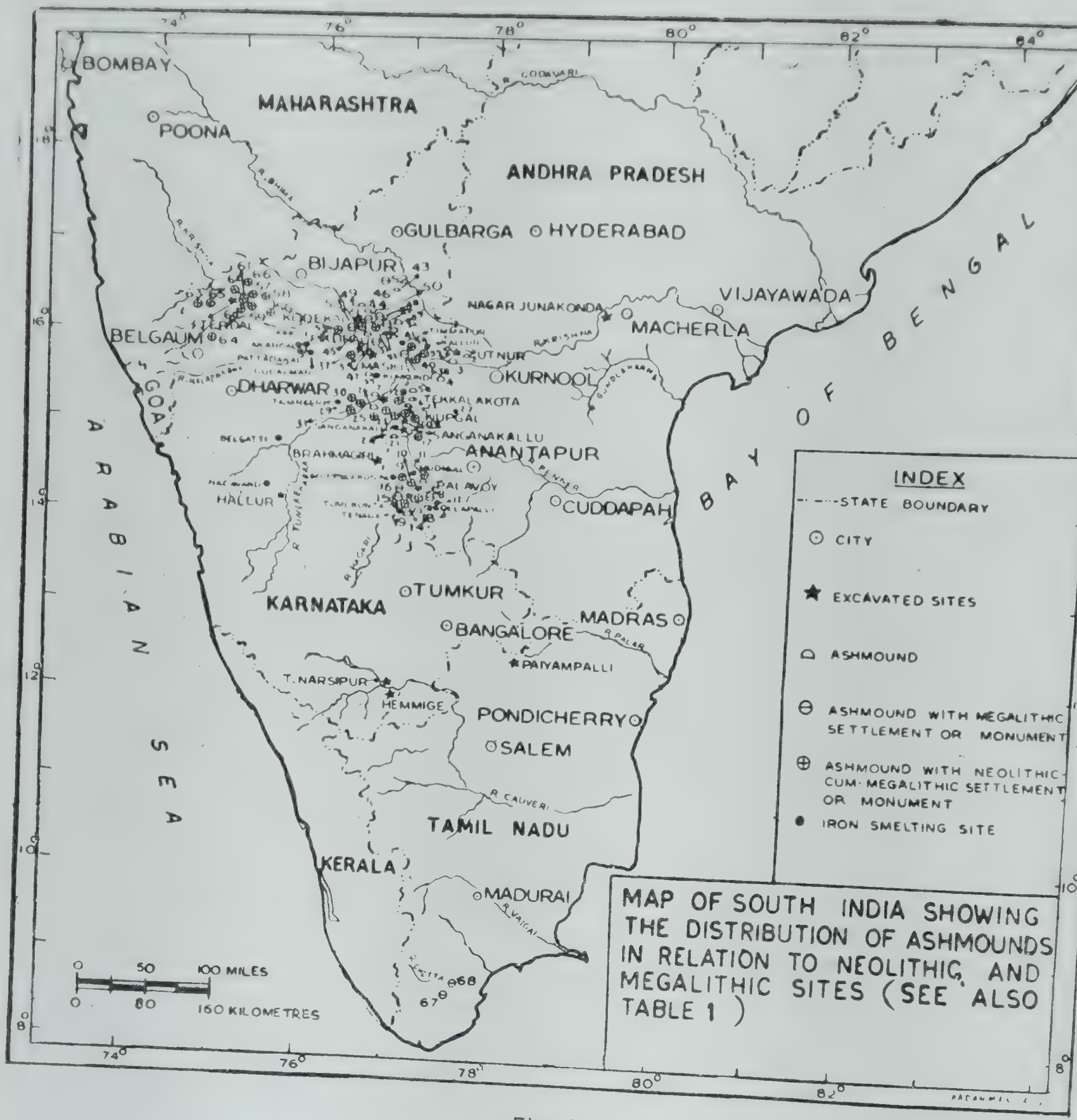

MAP OF SOUTH INDIA SHOWING THE DISTRIBUTION OF ASHMOUNDS IN RELATION TO NEOLITHIC AND MEGALITHIC SITES (SEE ALSO TABLE 1)
INDEX
STATE BOUNDARY
CITY
EXCAVATED SITES
ASHMOUND
ASHMOUND WITH MEGALITHIC SETTLEMENT OR MONUMENT
ASHMOUND WITH NEOLITHIC-CUM-MEGALITHIC SETTLEMENT OR MONUMENT
IRON SMELTING SITE
MAHARASHTRA
ANDHRA PRADESH
KARNATAKA
TAMIL NADU
KERALA
GOA
ARABIAN SEA
BAY OF BENGAL
BOMBAY
POONA
GULBARGA
HYDERABAD
BIJAPUR
NAGAR JUNAKONDA
MACHERLA
VIJAYAWADA
BELGAUM
DHARWAR
KURNOOL
UTNUR
MASKI
TEKKALAKOTA
KUPGAL
SANGANAKALLU
BRAHMAGIRI
ANANTAPUR
PALAVOY
CUDDAPAH
HALLUR
TUMKUR
BANGALORE
MADRAS
PAIYAMPALLI
T. NARSIPUR
HEMMIGE
PONDICHERRY
SALEM
MADURAI
R. GODAVARI
R. BHIMA
R. KRISHNA
R. PENNER
R. TUNGABHADRA
R. HAGARI
R. PALAR
R. CAUVERI
R. VAIGAI
0 50 100 MILES
0 80 160 KILOMETRES
74°
76°
78°
80°
82°
84°
8°
10°
12°
14°
16°
18°

Fig. III

stories and the place names containing the element 'budi' accounted for earlier hardly play any role in tracing the origin and chronology of South Indian ashmounds and do not withstand archaeological reality. We are therefore inclined to examine other types of evidence to seek solution to the problem.

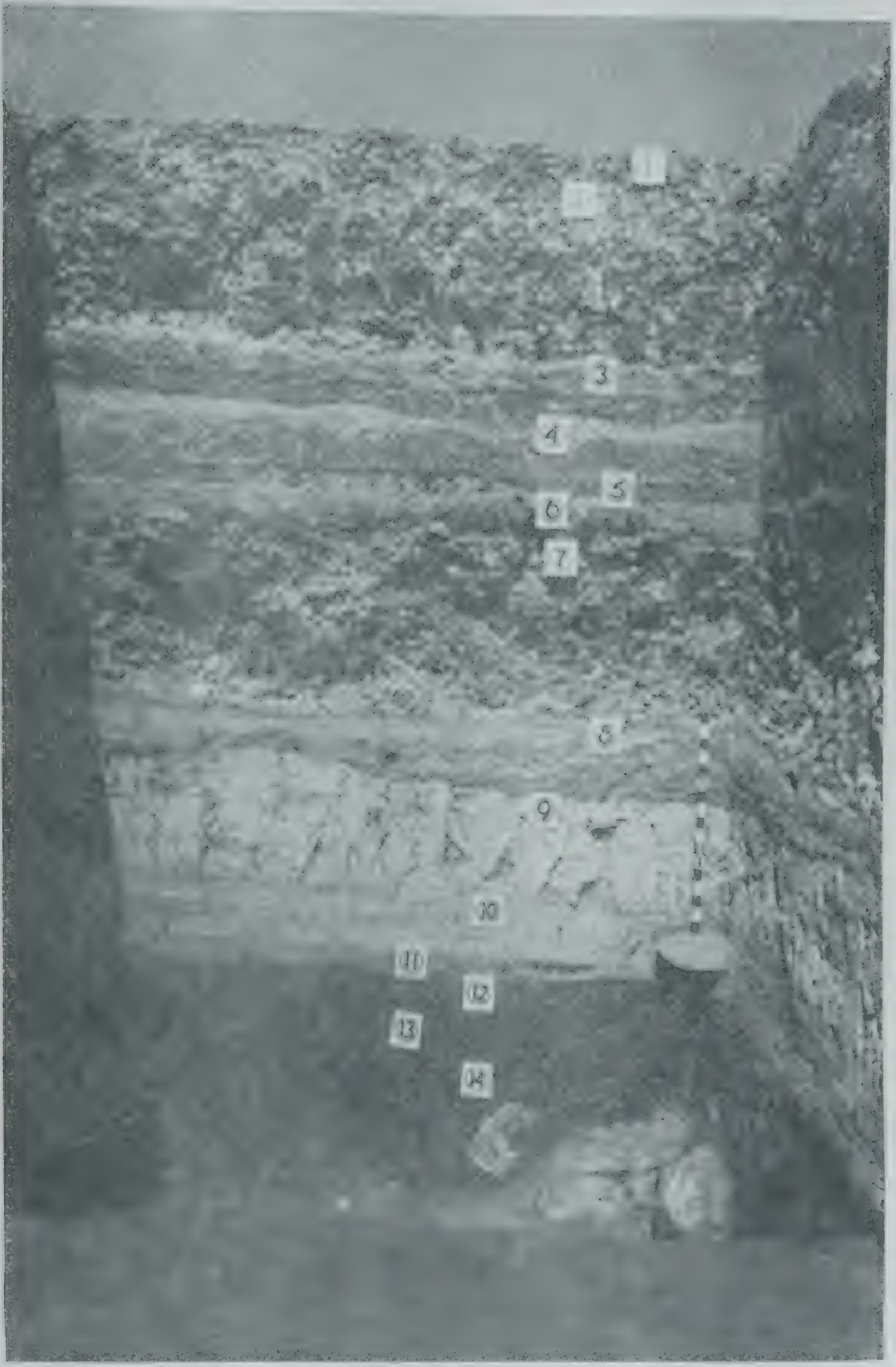
As shown by the explorations, the large majority of the ashmounds are geographically situated in the vicinity of neolithic and megalithic settlements/monuments associated with iron ore and slag pieces, megalithic pottery etc, usually at the feet of granite hills. The rest of them occur in isolation, but in any case they too lie almost in the proximity of megalithic settlements/monuments. In either situation of the mounds, not quite far from them, some iron-smelting sites also occur. This apart, the proportion of sites with ashmounds as compared to the large number of neolithic sites makes another factor of significance to the problem. So far over 300 neolithic sites have been reported in South India barely 20 percent of which alone revealed the existence of ashmounds, notably in areas where iron ore deposits are available, although their activity in areas devoid of iron ores could also be managed by importing them (Fig. III).

The stratigraphy at the excavated sites of Palavoy,Utnur,Kupgal & Terdal as well as the scraped section at Kodekal, or exposed sections at Kudatini, Wandall and Kudachi available for examination clearly demonstrated the occurrence of ash deposits of one or two burnings over the neolithic cultural debris. The latter deposit has not yielded any evidence of vitrified ash deposits indicating the commencement of the ashmound activity over the already existing neolithic deposit perhaps immediately after the decline and disappearence of its makers. The evidence of the nature of the deposits and the order of their occurrence strongly favours not only their independence from one another but also their diverse purpose. This finding is further supported by the occurrence of a negligible proportion of antiquities of neolithic-chalcolithic, character in the virtified ash deposits as compared to that from the underlying neolithic deposits. It is but natural to find objects of earlier cultures in the later cultures, which ("occurrence"), as Sundara (1971; p. 314) puts it, "may be due to the over-lapping of the neolithic and the megalithic cultures and cannot be taken as a strong evidence for the neolithic origin of the mound."

The last but one aspect concerns the purpose of burning of cowdung, the vitrification of which required high temperatures attainable by the addition of cactus twigs of green-semigreen-dried type, and quartz and feldspar grains as proved by our Palavoy field experiment. Thus the cowdung burning at high temperatures was a planned activity, which was certainly not associated with ritual burning as averred by some scholars like Allchin. The specific purpose for which the cowdung was burnt has also been supported by the evidence of intentionally prepared posthole-bearing floors occurring between the lower and upper ash deposits as at Palavoy and other sites.

The last but most important piece of evidence supporting the nature of planned activity from Palavoy consists of two iron objects-a crudely hammered nail and a ring-along with an iron ore piece, a slag lump and considerable quantity of megalithic pottery of the fabrics of black-and-red ware, burnished black ware, red ware and chocolate-slipped ware-all from the stratified layers of vitrified ash deposits, comparable finds of which occur on the surface and in the immediate vicinity of ashmounds.

All the above shown findings, archaeological and non-archaeological, from Andhra Pradesh and other parts of South India support the post-Neolithic or Megalithic character of the ashmounds, perhaps, resulted due to iron-smelting activities. Chronologically the ashmound folk came to the scene with an altogether new technology as revealed by the condition of the animal bones at a time when the Neolithic culture became highly matured replacing the latter and in some areas the neolithic folk themselves may have even adapted to Megalithic way of life as shown by the radiocarbon date from Palavoy (1500 B.C) and archaeological evidence.



Pl. I Palavoy – Ashmound I, Trench 1, Section facing east

Table 1: Ashmounds in South India

Sl. No.	Name of ashmound
1	2
	Andhra Pradesh : Mehabubnagar District.
1	Manchanapalli
2	Utnur
3	Talmari
	Kurnool District
4	Gudikallu
5	Kanchagara Belgallu
6	Lingadahalli
7	Suguru
	Anantapur District.
8	Andepalli
9	Hulikal
10	Palavoy (4 mounds)
11	Mudigal
12	Vantareddipalli
13	Mallipalli
14	Tenagal
15	Enuggavi Sandu
16	Bestarapalli
17	Malapuram
18	Bestarapalli (2 mounds)
	Karnataka : Chitradurga District.
19	Nagalapuram
20	Kolimipalyam
	Bellary District.
21	Kupgal (Sanganakal)
22	Halakundi
23	Sanavaspur
24	Gadiganur
25	Kurikuppa
26	Kakaballa
27	Nimbapur
28	Kudatini
29	Vali Dibba (Venkatapur)
30	Daroji
	Raichur District.
31	Benkal
32	Sivapur
33	Piklihal
34	Lingsugur
35	Yergunti
36	Kurkundi
37	Wandalli
38	Gaudur
39	Manvi
40	Rajulabanda
41	Gorkal
42	Budinni
43	Benkanhalli
44	Thanmandi Thanda
45	Kodekal
46	Mallur
47	Rajankolur
48	Kupi
49	Budihal-S
50	Tirth
51	Kakkera
52	Shakapur
53	Dimanhal
54	Tadibidi
	Bijapur District
55	Budihal-Nalwatwada
56	Bisnal
57	Shrguppi
58	Hippargi
59	Kullolli
60	Terdal
	Belgaum District.
61	Saptasagara
62	Kudachi
63	Sadalaga
64	Konnur
65	Examba
66	Satti
	Tamilnadu Tinnevelli District
67	Kilnattam
68	Tirthu

Table 2 : Pottery from Palavoy excavations (Palavoy III)

Mound	Trench	Layer	Megalithic Pottery Wares				Total Sherds of Meg. Wares	Neolithic Pottery Wares		Total sherds of Neolithic Wares
			Black and-red :	Black and	Red :	Choco–late–slipped		Blotchy Grey	Dull Red	
I	1	2	5	...	25	11	41	3	2	5
		4	...	1	....	....	1	2	—	2
		6	....	—	—	—	—	1	—	1
		7	1	—	4	4	9	—	1	1
		8	....	—	1	3	4	—	—	—
	Total of trench 1		6	1	30	18	55	6	3	9
	2	2	1	—	—	—	1	2	1	3
		3	5	—	1	—	6	2	—	2
		4	4	—	7	2	13	7	1	8
		5	—	—	—	1	1	—	—	...
		6	—	—	—	1	1	11	1	12
		8	—	—	3	1	4	5	2	7
	Total of trench 2		10	—	11	5	26	27	5	32
Total of both trenches			16	1	41	23	81	33	8	41

Table 3 : Animal remains from Palavoy Excavations (Palavoy III)

Description	Cattle	Sheep/Goats	Total
Skull :			
Teeth (molar)	2	....	2
Jaw	1	1	2
Cranium	3	—	3
Vertebral Column :			
Atlas	1	—	1
Vertebrae :			
Cervical	2	—	2
Thoracic	1	—	1
Lumbar	3	....	3
Ribs :	11	....	11
Fore Limb :			
Humerus	6	—	6
Radius	3	—	3
Ulna	2	—	2
Carpus :			
(a) II and III Carpal	1	....	1
(b) Radial Carpal	1	....	1
(c) Intermediate Carpal	1	....	1
Metacarpus :	5	....	5
Phalanges :			
First	5	....	5
Second	2	....	2
Inominate :	1	2*	3
Hind Limb :			
Femur	3	....	3
Tibia	3	....	3
Tarsus :			
Tibial tarsals	4	....	4
TOTAL :	61 95.31	3 4.69	64 100.00

The underlined figures represent percentage.

12 THE ENVIRONMENT AND ECONOMY OF THE NEOLITHIC CULTURES OF SOUTH INDIA : PALAEOBOTANICAL EVIDENCE

Vishnu Mittre and Savithri Ravi (Mrs)

INTRODUCTION

Quite a few (over 150) Neolithic sites have been discovered in South India of which slightly over a dozen have yielded substantial evidence for the Neolithic cultures. Most of these sites occur in Karnataka barring some in Tamil Nadu and Andhra Pradesh. From the available radiocarbon dates it appears that the Neolithic in South India lasted for about 1000 years. Three periods of cultural development have been recognised by Allchin and Allchin (1968) namely (1) 2300 B.C. 1800 B.C.– ametallic phase, (2) 1800 B.C. 1500 B.C.–with bronze and copper, (3) 1400 B.C. to 1100 B.C. However, Sankalia (1974, 520) recognised only two, the early and the late phases. Whatever be the finer classification of the Neolithic culture in South India, the studies and the relationships of the artefacts have revealed cultural waves from north western India in addition to some indigeneous features. If this is true, the economy of the south Indian Neolithic peoples must have been affected by the economy of contemporary peoples in western and northwestern India. This would be possible only if the environmental pattern that existed here then was much the same.

Both the environment and plant economy of the South Indian Neolithic cultures are reconstructed here from the plant remains (charcoals and food grains) as given in Tables 1-3b and recovered from a few sites only. Pollen analysis carried out by the senior author of sediments from Tekkalkota proved futile as no pollen was recovered therefrom.

Palaeoenvironment

Charcoals are usually derived from selected plant species, their reliance for past environment may be limited. In context of the Neolithic cultures, however, their reliance becomes greater as it is during the Neolithic times that man began exercising greater influence upon vegetation and his selectivity of useful plant species arose subsequently as a consequence of it. The use of the same plant species as fuel or as timber in a wider geographical area would indicate its local availability as a member of wild vegetation and this could certainly be taken to infer safely the past environment.

The charcoals have been examined from Sangankallu, Tekkalkota and Hallur (Savithri, 1976). Hallur is located over 200 km SW of Tekkalkota in the Dharwar district and Sangankallu is not very far from Tekkalkota in the Bellary district. The charcoals at Sangankallu are dated by radiocarbon from 1400–1500 B. C. Thus, they belong to the mid to late phases of Neolithic cultures.

At Tekkalkota the charcoals are all derived from *Soymida febrifuga*, the charcoals of which also occur at Sangankallu along with those of *Acacia* and *Albizzia*. At Hallur the charcoals are identified as of *Anogeissus*, *Albizzia*, *Holarrhena* antidysentrica and *Polyalthia*. Bamboo has not been identified although it is believed to have been used in thatched huts. It must be admitted that insufficiency of morphological data in the charcoals did not permit specific identification of all the plant species.

Of these ''*Soymida febrifuga* occurs commonly in the dry deciduous forests in south India and other parts of India under 300-1000 mm precipitation with 7–8 months dry. The minimum temperature of the coldest month is under 20°C. The hard and durable wood is used for construction, agricultural implements, fuel, etc. Species of *Acacia* occur in dry and arid regions in thorny scrubs on river alluvium subject to inundation, and on bare gravelly soil in the drier parts of Deccan and also in black cotton soil. The normal rainfall under which Acacias occur varies from 75mm to 1250mm with the maximum shade temperature 40°–50°C and the minimum below 15°C. Wood yields excellent fuel, gum and tannin and ploughs and tool handles are made of it.

Albizzia grows on alluvial grounds along streams in the *Albizzia-Acaciah, Albizzia–Anogeissus* forests under 500-800 mm rainfall with dry months 7-8 and also under higher rainfall. Wood of *Albizzia* is used for construction, agricultural implements for carts, crushers, etc. *Anogeissus* is a member of dry deciduous *Anogeissus–Albizzia* and *Anogeissus–Terminalia-Teak* forests. Essentially it is a tree of hot dry regions on well drained alluvial soils under normal rainfall from 600-2300 mm, with maximum temperatures from 38.5°C to 47.5° C. The hard and tough wood is used for cart axles, poles, and rafters, axe handles, agricultural implements and as fuel.

Holarrhena antidyssentrica is a member of dry deciduous forests, scrub forests and open waste lands under rainfall from 750 m to 3000 mm with maximum temperatures from 40°C–47.5°C. Wood is used for turnery and carving. *Polyalthia* occurs in the dry mixed deciduous forest with *Chloroxylon, Anogeissus* and *Albizzia* under 600-800 mm rainfall with 6–7 months dry and with mean temperature of the coldest month not below 20°C. *P. fragrans* is a subtropical hill Savannah plant occurring under 2000 m rainfall with 4-5 months dry in the *Dipterocarpus-Mesua-Palaquium* community.

Teak does occur in dry localities subject to great heat and brought in the hot season where the rainfall is 750 m or less though thrives best in the moist warm tropical climate under much higher rainfall. Wood is used for wheel spokes, construction and piles.

The present day vegetation in the region once occupied by south Indian Neolithic peoples comprises of low open forests, low thickets and shrub savannah which occurs in patches of *Anogeissus–Terminalia* and *Tectona* society in district of Bidar and in NW of Bellary and Mehbubnagar districts; patches of open forest of *Hardwickia-Pterocarpus-Anogeissus* in the Mehbubnagar, Gulbarga and Raichur districts and in the Kaveri River area; *Acacia–Capparis* pseudo–steppe and low scattered shrubs in Bijapur district; low scattered shrubs, discontinuous thickets and pseudosteppe and savannah woodland of *Hardwickia-Anogeissus* type in the Shorapur Doab; *Hardwickla-Anogeissus* low scattered shrubs and pseudosteppe in the southwest of Bellary district; *Albizzia-Acacia* community scattered in thickets of *Hardwickia–Anogeissus* in Anantpur district with *Phoenix,* and low scattered shrubs of *Anogelssus-Chloroxylon-Albizzia* amara community in Karnataka state with planted trees of coconut. Bamboos are the noteworthy feature. The genera identified from charcoals occur in the plant communities described above. Various stages of degration are seen as a result of fire, lopping, felling and uncontrolled grazing approaching the final stage of barren hills devoid

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The information on the distribution and climatic requirements of modern plant species and forests is based upon Gaussen *et al.* 1964, 1965, 1966a, 1966b.

of woody vegetation and subject to intense erosion. The absence of charcoal of *Hardwickia* may be explained due to its non-exploitation until recent times because of the very hard nature of its wood and often spared and left standing.

The present day precipitation in Karnataka and the region around once occupied by the Neolithic peoples ranges from 500–1000mm with 7-9 months dry. No doubt the present day vegetation is much degraded owing to the continuous biotic influence since the Neolithic times, but at the time the Neolithic man came to settle down here or lived here, the dry deciduous forests existed here along with grasslands on open areas under a dry climate with precipitation, temperatures and duration of the dry period much as at present.

Plant Economy

Remains of food grains (Vishnu–Mittre, 1971; pp. 125–133), (1974; pp. 3-30), (1977; pp. 570-88) are so far known only from three sites, Tekkalkota, Hallur and Paiyampalli. Hallur is located about 200 km southwest of Tekkalkota and Paiyampalli about 400 km towards southeast of it and most of the sites discovered occur in the vicinity of Tekkalkota and almost all of them within the triangle formed by these three sites. In view of this the plant economy as known from those three sites, may be considered representative of the entire south Indian Neolithic until fresh information to the contrary is discovered.

Carbonised seeds of three crops: *Eleusine coracana* (Ragi), *Dolichos biflorus* (Kulthi, Horsegram), and *Phaseolus aureus* (Moong, Green Gram) have been discovered.

*Eleusine coracana** is a cosmopolitan crop as it can be grown both under irrigated (through tanks and canals) and rainfed conditions in all kinds of soils including alkaline soils. It can be sown in any season and in limited conditions of water supply. Even today in the region occupied by the Neolithic peoples, Ragi is the principal crop (over 50%), and rice (under 10%) only where irrigation has been introduced.

The possibility cannot be overlooked, although evidence is lacking, that minor millets next in importance to Ragi, such as Korra (*Setaria italica*), Varagu *(Paspalum scroticulatum)* and Samai (*Panicum milliaceum*) must have been grown by the Neolithic peoples. They together with Ragi constitute the staple diet of poor people, and come up even in poor soils under conditions of precarious rainfall. Manuring is uncommon except farmyard manure.

Horse gram, *polichos biflorus,* is cultivated in very poor soils and in seasons where the rainfall is delayed to the extent that no other crop can be grown.

Green gram, *Phaseolus aureus,* is grown in the deltaic region. Usually grown as a Kharif crop, it comes up well in loamy soil but not so well on heavier soil. As a mixture with millets, it is also grown in Rabi season in mixed cropping pattern.

Dolichos biflorus and Ragi are the crops which feature predominantly in the primi–

Information on these crops is from Sastry and Viart 1962 and from Gaussen *et al.* 1964, 1965, 1966a, 1966b.

tive and shifting cultivation practices today. They are grown for two to three years then area abandoned and fresh cultivation taken up in another area.

These crops grow under rainfall varying from 600 mm to 1000 mm with mean temperature of the hottest month from 30°C to 35°C and of the coldest month from 20.7°C to 24.4°C. Total dry months may be from 5–8 in a year with total dry days from 140-200 or over. Higher temperature in May and at the end of dry season reinforces the effect of dryness and increases the intensity of evapotranspiration.

Millets even today are the principal crops in the district of Dharwar, Raichur, Bellary, Kurnool, Anantpur, Bijapur, Gulbarga, Mehbubnagar and North Arcot from where the Neolithic settlement sites have been discovered. Rice, wheat, cotton, ground nut, tubacco, *etc.*, the crops introduced subsequently in the historical times occupy very small acreage. Disregarding the introduced crops, millets remain the only crops just as during the Neolithic times.

The plant economy of the Neolithic times suggests primitive methods of cultivation including the practice of shifting cultivation, prevalence of dry climate and selection of such crops which could grow on any kind of poor soil under precarious rainfall conditions and even when rains were delayed or failed.

CONCLUSION

It is not possible to reconstruct the past vegetation and palaeoenvironment from a few plant species identified from charcoals. Nevertheless the data have allowed the prevalence of dry climate not much different from that prevalent today. The forests in various stages of degradation are due to the combined effect of man and his grazing animals, as a result of which thorny, unpalatable species or those resistant to fire occur more profusely. The density of human population per sq. km. in districts of Anantpur, Kurnool, Mehbubnagar, Bellary, Bijapur, Gulbarga and Raichur is from 76-97% and 140 to 142% in Dharwar and Mysore districts as compared to over 300% in Bangalore district. During the Neolithic times the density of human population was indeed much less and the forests were not much degraded except by natural causes. The domesticated animals then perhaps far outnumbered the human population. Among these the Zebu cattle far outnumbered the buffaloes and the sheep and goats and pigs made up a sizeable number (more or less 50% of cattle are seen today in Andhra Pradesh). And there were the other domesticated animals too. To maintain such vast herds of animals as the cattle pens and ashmounds (Allchin, 1963) would suggest the Neolithic peoples must have resorted to large-scale destruction of forests through fire, followed by devastation through grazing and lopping. We have indeed no means to assess the magnitude.

The forested area was much higher than the present day statistics of 1% in Raichur district, 10% in Anantpur district, 16% in Bellary district and 29% in Kurnool. Much of the land now under cultivation (48-53% in Karnool and Anantpur districts; 64% in Bellary district, 84% in Dharwar and Raichur districts) and a small percentage under fruit orchards (4-21%) and wastelands (4-16%) must have been under the dry deciduous undisturbed forests at the commencement during early phases of tha Neolithic. This does not suggest that the temperature and precipitation regimes were more favourable and better than today.

Average humidity at Bellary 449 alt. with 9 dry months, precipitation 500 and 1000 mm and temperature over 20°C is 45% but at Mercara 1152 alt. with 3-4 dry months and the same precipitation range but temperature of the coldest month below 20°C is 65%. There was indeed more of organic deposit in the soil under the undisturbed forests and this might have been interpreted as a result of more humidity at Kupgal (Sankalia 1974). This is essentially a microclimatic feature rather a macroclimatic one.

The selection of Ragi, Horsegram by the Neolithic pastoral-cum-farming peoples is again suggestive of the prevalance of dry climate. Both the crops are hardy and can grow on any kind of soils under extremely poor or precarious precipitation. And the pattern has not much changed except with the introduction of irrigation and additional crops. The association of these crops with shifting cultivation by the tribals is highy suggestive of the shifting cultivation practicised by the Neolithic folks in South India.

The shifting cultivation is a primitive trait, any inference of that would suggest that the south Indian Neolithic folks were primitive peoples. On the contrary various kinds of pottery, wheel and gold ornaments are highly suggestive of a varied, richer and sophisticated life with cultural and trade contacts (Sankalia 1974). Although shifting cultivation cannot be excluded, yet a primitive type of dry land farming must have been practised, the kind of which is seen even today in the districts of Kurnool and Anantpur in Andhra Pradesh (Sastry & Viart 1962; p. 32). Here rainfall is low and temperature high. The soils are clayey and clayey-loamy and to have good agricultural produce the conservation of soil moisture is essential. The soils are ploughed deep about 46 cm to 51 cm once in three and four years to eradicate weeds and grasses. The field is worked a number of times every year with a local blade harrow with blade about 61 cm long. Mixture of seeds of crops maturing at different times is then sown with two implements, a local seed drill calleg Gorur with a funnel shaped tube tied to drill to drop seeds in furrow opened by the drill. The crops are earthed up with the help of a Danti, small harrow blade and intercultivated in order to create a soil mulch and to prevent evaporation. This most ancient farming method is practised with implements made of wood and steel by the village carpenters and smiths. Has it been practised here since the Iron Age or was practised earlier also without iron? Were the terraces in the castellated hills also prepared for cultivation? These are some of the questions that remain to be answered.

The plant species identified from charcoals are even today used for poles, posts, wheel spokes, agricultural implements and as fuel. The evidence of wood posts, the use of bamboo, palm leaves as mats and wheel suggests a similar use of these woods in the Neolithic times.

Plant life particularly the crops do provide evidence of cultural contacts. It has been observed that the south Indian Neolithic blade industry reminds that of Maheshwar and Indus civilization and the painted black and red ware suggests cultural contacts with the northern chalcolithic cultures and further evidence Jorwe carinated ware with radiating triangles and wavy lines has also been observed (Sankalia, 1974). Chronologically speaking, the Harappan culture is contemporary with the southern early Neolithic, the late phase of which is contemporary with the Jorwe phase.

The predominant crops wheat, barley and rice of the Harappan and Jorwe cultures never reached here owing to the geographical and climatic barrier. Ragi has recently been discovered from the Harappan site Surkotada in Kutch and *Dolichos biflorus* and *Phaseolus* aureus are common crops with Jorwe and south Indian Neolithic cultures (Vishnu-Mittre 1974 : pp. 3-30, 1977 ; pp. 570-588) (Savithri, 1976). Which way, N to S or vice versa, the diffusion has been remains to be determined ?

Of these crops, Ragi is believed to have been domesticated in Africa wherefrom it was diffused into India possibly through maritime trade. Its find in Kutch is highly suggestive of the maritime trade. Was it brought to south through trade contacts from the northwest or directly from the maritime trade with Africa through western coast ? We indeed need to know more to answer these questions.

Recent discoveries of progenitor of Ragi, *Eleusine africana* in M. P. by Vishnu Mitre and Aruna Sharma reveals possibilities of domestication of Ragi in India independent of Africa. This immediate ancestor of Ragi has not been known so far from India.

Table 1

SANGANAKALLU, KARNATAKA (NEOLITHIC)

Depth in metres	TF. Nos	Layer	Identity	Age
1.40	355	(2)	*Acacia* sp.	1485 B. C.
?	357	(?)	*Acacia* sp.	
?	358	(?)	*Soymida febrifuga*	
2.40	359	(4)	?	1450 B. C.
2.50	354	(3)	*Soymida febrifuga*	1490 B. C.
2.50	354	(3)	*Acacia* sp.	,,
2.50	354	(3)	*Albizzia* sp.	,,
	352	(?)	*Albizzia* sp.	?
	351	(?)	*Acaia* sp.	?

Table 2

TEKKALKOTA, KARNATAKA (NEOLITHIC)
PLANT REMAINS IN STRATIGRAPHICAL CONTEXT

Depth in metres	TF. Nos	Layer (1)	TF. Nos.		TF. Nos.	Layer (4)
0.02—0.07			269	*Soymida febrifuga*		
0.17	265	*Soymida febrifuga*	266	,, ,, (1675 B.C.)		
0.25	262	,, ,, (1510 B. C.)	267	*Soymida febrifuga*		
0.30	263) 281)	,, ,,				
0.37	268	,, ,,				
0.42	264	,, ,,				
0.47			270	,, ,,		
0.50			271	,, ,,		
0.61			272) 273)	,, ,,		
0.63					279	*Soymida febrifuga*
0.91			276	,, ,,		
1.00					280	,, ,,
1.05					237	,, ,, (1515 B. C.)
9.30					238	,, ,,

TABLE 3a

HALLUR, KARNATAKA (NEOLITHIC)
PLANT REMAINS IN STRATIGRAPHICAL CONTEXT

Depth in metres	TF. Nos.	Layer	Identity	Age
1.80–2.10	570	(4)	?	1020 B.C. Overlap phase between Neolithic and Megalithic.
?	571	(?)	*Polyalthia* sp.	
?	572	(?)	*Polyalthia* and *Anogeissus*	
2.50–3.50	573	(5)	*Polyalthia* sp.	870 B.C. Overlap between Megalithic and Neolithic
3.20	575	(7)	?	945 B.C. Late Neolithic phase.
?	577	(?)	*Albizzia* sp,	
6.10–6.40	580	(14)	*Albizzia*, *Anogeissus* and *Polyalthia*	1610 B.C. Early Neolithic
?	581	(?)	*Holarrhena antidysenterica*	

TABLE 3b

HALLUR, KARNATAKA
PLANT REMAINS IN STRATIGRAPHICAL CONTEXT

S. No.	Rec. No.	Tr. No.	Sub. Sq.	Layer No.	Depth	Remarks	Identification
1	85	1	2	9	380 cm B.S.	Collection from floor of the circular House, No. 1	*Eleusine coracana* Gaertn.
2	353	2	1	7	250 cm. B.S.	—	*Eleusine coracana* Gaertn. and *E. Indica Gaertn*
3	331	1	1	14	680 cm. B.S.	—	*Tectona grandis* Linn.
4	463	1	2	10	455 cm.	Pit E sealed by Layer 10.	*Tectona grandis* Linn.
5	69	2	2	5	337 cm.	Arrowhead	*? Paspalum Scrobiculatum* Linn
6	108	1	4	5	325 cm. B.S.	Arrowhead	*Oryza sativa* Linn *? Paspalum scrobiculatum* Linn.

ILLUSTRATIONS

Plate I

Albizzia lebbeck

1. Cross-section of characoal piece showing typical aliform paratracheal parenchyma, forming cyelets round the pores, and black deposits often filling the pore cavity either completely or partially x 40. *Acacia* sp.

2. Cross section of charcoal piece showing vessel distribution and parenchyma pattern x 40.

3. Tangential section of charcoal piece showing homogeneous rays exhibiting ehelon arrangement x 120.

Soymida febrifuga

4. Cross-section of charcoal piece showing distribution of vessels and arrangement of parenchyma ; and vessels plugged with black gom like deposits x 40.

Plate II

1 Carbonised seeds of *Dolichos biflorus*

2 Carbonised seeds of *Phaseolus aureus*.

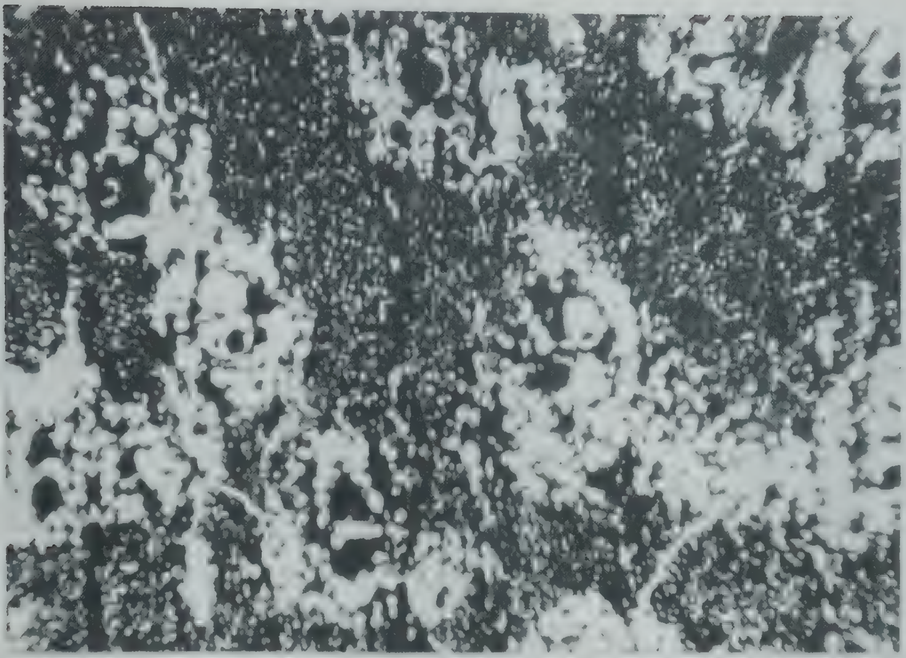
3 Carbonised seeds of *Eleusine coracana* from Hallur x 10. *Polyalthia* sp.

4 Cross-section of charcoal piece showing typically retialate type of parenchyma forming a net like structure, and vends uniformly distributed in radial multiples of 2–3 x 40.

Holarrhena antigysenterica

5 Cross section of charcoal piece showing numerous small pores grouped in straight radial limes, and numerous very fine medullary rays. x 40.

PLATE-1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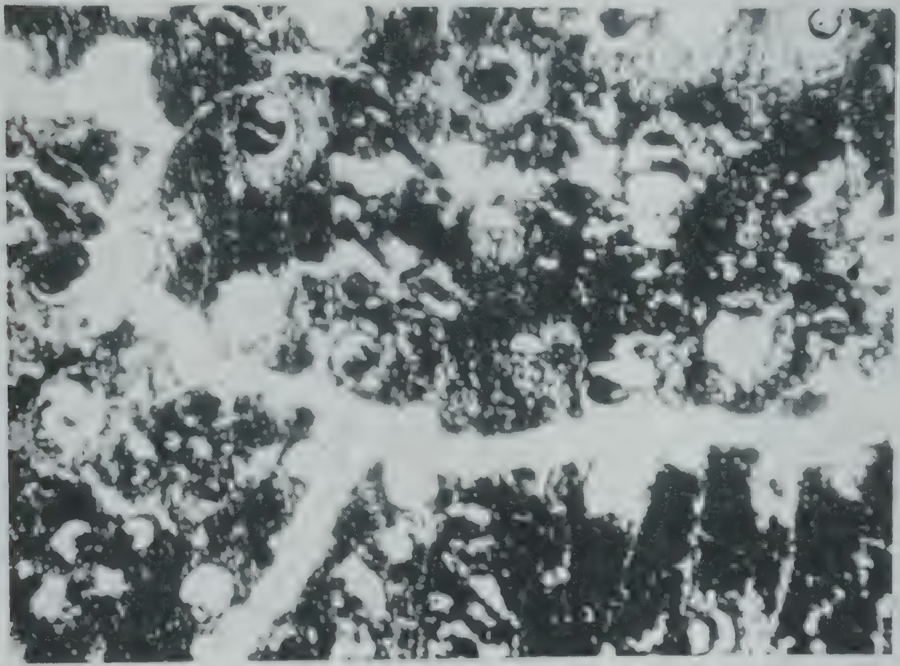
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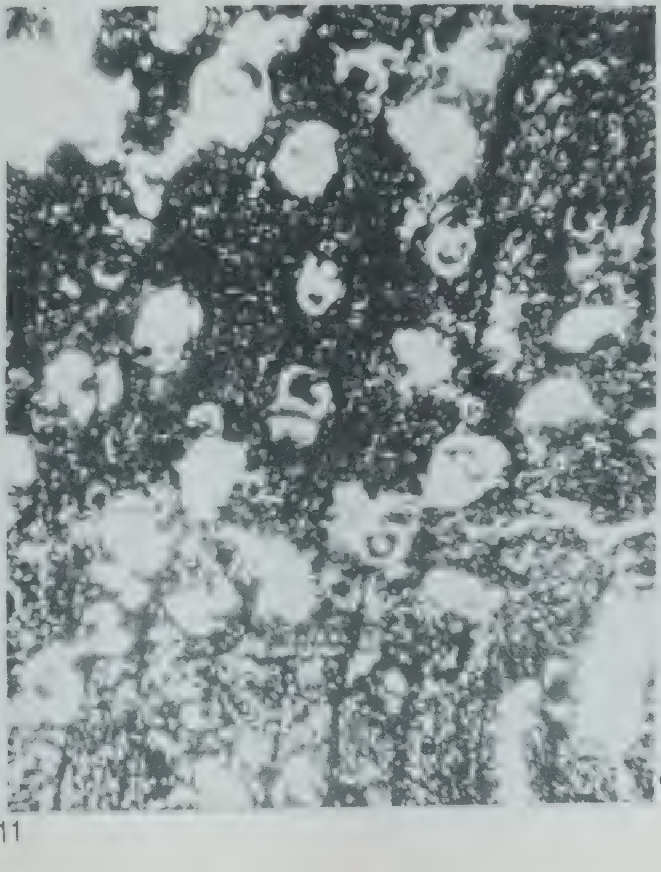
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PLATE-2

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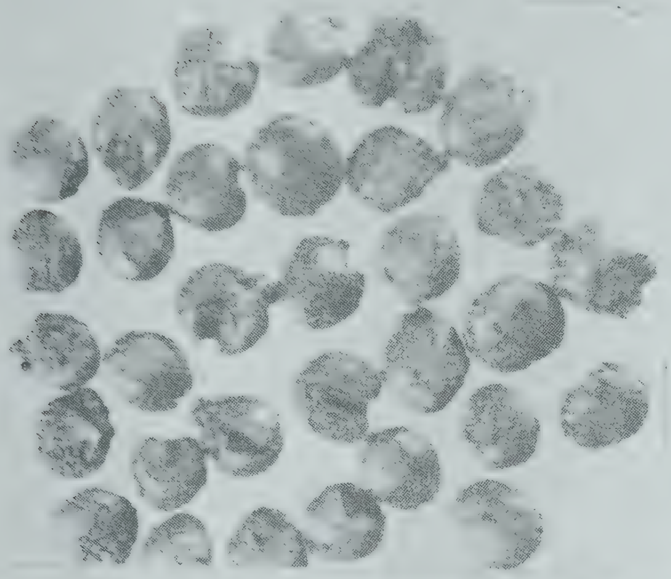

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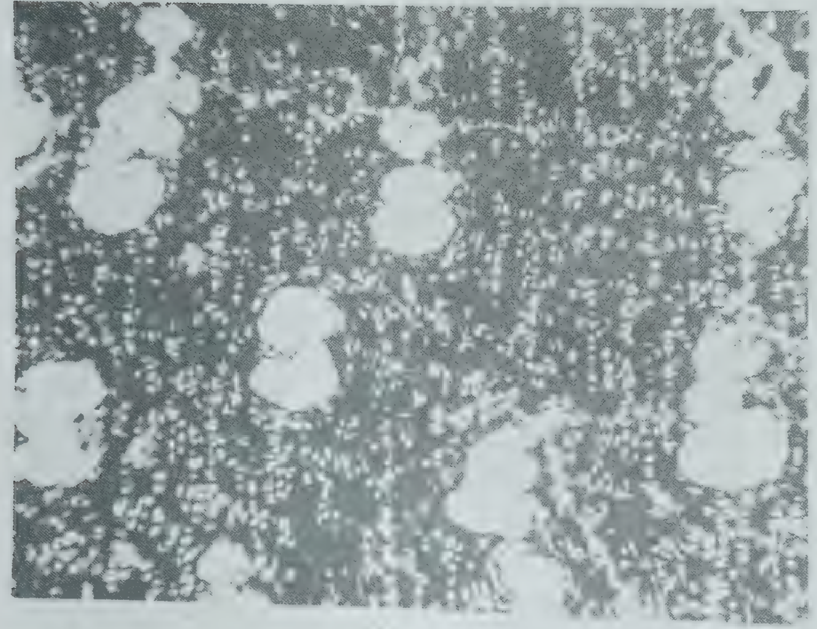

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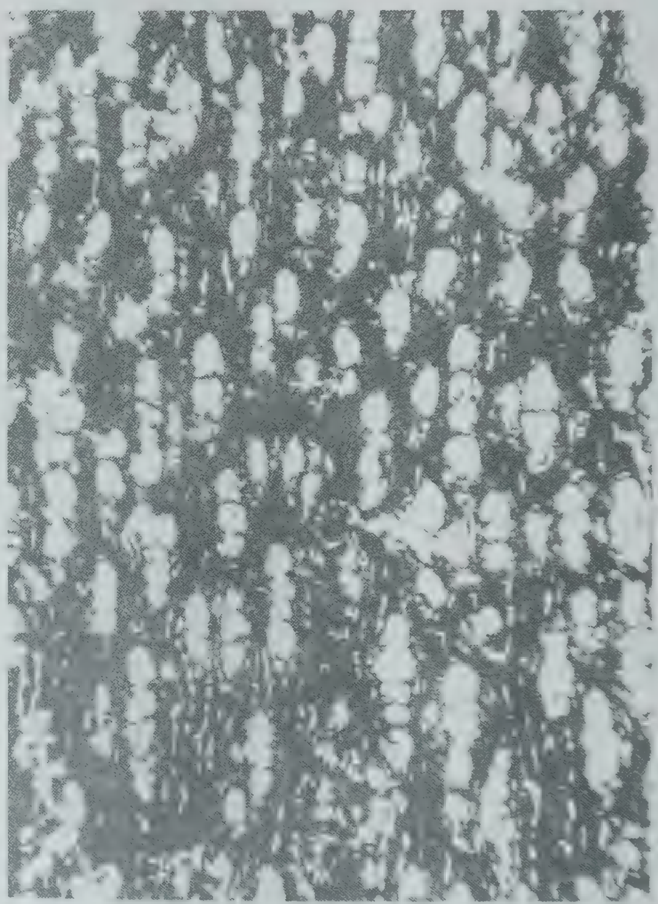

13. PREHISTORIC ANIMALS AND HUMAN CULTURE IN KARNATAKA

K.R. Alur

The study of prehistoric animals and its relation to human culture is a naughty problem of scientific interest. In that phase, the society was a combination of man and animals only, of which man was hunting and gathering agent while animals were his hunted objects. This fact bears support from the archaeological faunal remains, which I will describe under ''Food habits of ancient dwellers''. The 'Pastoral culture' which emerged later, laid the foundation for agronomy and animal husbandry practices, terminating in their 'Domestication'. Ever since, the man assumed the habit of living on permanent settlement, his relation with the animal world has undergone a profound change. As a hunter and food collector, he was part of nature; but as a settler, he became their protector. It is curious that the first domestication of animals started in India about 8000 thousand years before (*Deccan Herald*, 14th Aug. 1985).

A symptom of modern civilisation, crept in much later. The present day society is a baby offshoot of all the above maternal phenomenas of the past. We will be able to trace the thin thread that connects all these events, if we make a critical study of the faunal remains of different phases.

Faunal World of Karnataka

Karnataka, is a rich and fertile field for various wild fauna due to its nature of terrain and ecological factors ; hence it is correctly described as the *'Southern Himalayas of India'*. Wild fauna, which have become extinct in the neighbouring states, still flourish on the Karnataka soil. Wild life sanctuary at Bandipur, the bird-lake garden at Ranganatittu and antilope denizen of Ranebennur, are all living abodes o prehistoric animals.

Species of animals identified from the excavation sites.

1)	Cattle	Bovidae
2)	Sheep	Capridae
3)	Goats	Ovidae
4)	Antilopes	Antilopadae
5)	Dogs	Canidae
6)	Horse	Equidae
7)	Fowl	Aves (Gallus fharyngenious)
8)	Rodents	Rattus rattus

Note : The species identified above have been described in the excavation reports of Terdal (Sundara, 1971 ; pp. 23-24), Hallur (Nagaraja Rao, M.S. ; 1971 ; pp. 108-123), T. Narsipur (Seshadri, M. ; 1971 ; pp. 99-104), Kolar (Allchin, F.R.; 1970 ; pp. 54-63), Kolar gold fields, Utnoor (Nagaraja Rao, Ansari Z.A. ; 1969 ; pp. 29-32), Sangankallu etc.

From the above list, one should not be lead to infer that only these animals are habitants of Karnataka locale. Large number of other wild fauna flourish even now in this region of which, terrainians are, elephants, tigers, bears, leopards, hyenas ; the subterrainians are, reptiles, rodents and bandicoots ; amphibians are, crocodiles and water snakes ; aquatics are, fishes and sea water mammals ; and aves as buster etc. This list can never be completed.

In excavations, we mostly recover bones of animals which were hunted and preyed by the ancient dwellers. They are mostly herbivorous mammals, as the flesh of carnivores animals was never a morsel to the human mouth. Hence, their hunting was never practiced unless on occasions when they proved a menace to the human society; so, the chances of their recovery are rare.

In the bone collections from osteological sites, cattle always dominate in number due to hunting and subsequent discaharge as food refuse. This is no indication of their animal population on site. Besides, these herbivorous mammals have some natural disadvantage. They graze in the open fields for most part of the day. They being herbivorous, do not attack human beings or other animals for their food. By nature, they are lethargic, and are an easy prey to the invaders, edibility of their flesh, combined with their non-aggressive nature, renders them an easy victum to the greedy hunters.

The cattle of Karnataka have some special features, in contrast to the hill cattle witnessed in other regions. Some are very dwarf, while others are massive. The genuine wild cattle are huge, fierce and aggressive, as could be inferred from the findings of archaeological excavations, as for example in Utnoor (Allchin, 1970). Here the bones are classified to belong to very big, big-medium and small animals. This fact has been corroborated by the author by stating 'A number of bones are from animals whose size is notably small.' This condition can be attributed to local in-breeding, which is inevitable.

The parent Ox is said to have been much larger than any of the present varieties The URUS in its wild state at least was an enormous and fierce animal. There is a fine specimen in the British museum (Alur, K. R; 1970).

They are now dwarf animals of lessened vigour and lower productivity. These animals which are denizens of the plains abutting hills prefer to graze on ground sweeping rhysome and runner grass; instead of the tall and stumpy napier and elephant variety. This is manifest by the excavation sites of Karnataka which are all situated in the plains. The indication is that like the animal population, human beings too, preferred to dwell on the banks of the gentle flowing rivers, instead of the turbulent rivers of the mountain tops.

Cultural relation between human beings and animals

Culture, as is understood in the modern context, did not exist in the prehistoric period. Only the natural laws governed the society. His only quest was to satisfy his instinctive demands of hunger, thirst and productivity. Food was his main problem and the entire day was devoted for the same.

Food habits of ancient Indian dwellers

In that phase, main source of human food was animal flesh. Symptoms of the presence of either agriculture or horticulture are not identified; but symptoms of having consumed animal meat are plenty, which are detailed below. When and how he learnt to consume animal flesh is shrouded in mystery. His urge of hunger coupled with the sight of carnivorous animals ransacking the body of their victim, might have induced him to follow the same. His preference to the flesh of herbivorous animals, is a matter of palatability.

Hunting Practices

In the context of the weponary comparable to the modern archery, he was left with no alternative, except to dominate the prey by his physical strength. So, he cornered the bait into a thick bush and closed the exit. Fast and fear, mostly killed the capture. The final destruction was done either by darting stone splinters or by hurling heavy stones. This system, which is still in vogue and practiced by Adivasis, is called as "Beating the prey". Evidence of this practice has been identified and reported in the excavation report on T. Narasipur by a sustained depressed fracture in the chest (Seshadri, M; 1971; pp. 103-4).

Roasting of the carcass

The dental pattern of the human mouth coupled with incapacity for vivisection forced the habitants to roast the carcass before extracting its flesh. The symptom of roasting in open fire have been identified by the deposition of thick black soot on the bony segments, found in the excavations at Hallur, T. Narasipura, Terdal, Utnoor etc.

Chopping

The next preblem is to detach the adhered flesh from the bones. Human effort howso-ever strong, will not detach the deeply embedded tendon roots and muscle fibres from the bone tissue. The severance of the same by chopping, have enough evidences in the bone collection. The dent left on the body of the green bone marks a series of depressed cancelli to be viewed under a projected light with series of convex magnifying lenses, alternated with focal illumination. (Nagaraja Rao, M.S., 1971 ; p. 120 ; Plate xvi, 1-3).

Bone tools

Another associate of the food problem of the ancient dwellers, is bone tools. These are of the nature of gouges, lancets, scrapers, pointers, rubbers etc. Without these it is impossible to detach the adhered flesh. In the absense of any metal being known, they fashioned them from bone splinters and antlers. In this list is also included a drinking vessel fashioned by scooping the tibial condyle and a serving bowl, from plasteron of the tortoise (Journal of History of Science Vols. I and II, 1973, p. 110, plates IX-XI).

Bone Marrow as food

This is really strange, that they had discovered the presence of marrow in the medullary cavity of long bones, which has no external aperture. It also formed part of their diet. They cleverly managed to salvage the same by making a flute type window at one end and sucked it from upside down to prevent spilling.

Clothing.

The nature of this material has not yet been identified. Clothing is a modern concept of artificial nature. Nature has provided the much needed clothing to all it's creation. Indian mythology states that skin of the deer (Krishnanjana), skin of the tiger (Vyagra charma) and skin of the elephant (Gaja charma) was worne as apparel both by people and their deties. The raw skin termed 'Hyde' becomes stone hard in three or four days after pealing and hence unfit to wrap round, It can only be used after tanning, a process in vogue since last hundred years. Probably, they were mostly 'Nude' for which there are strong sculptural evidences. Sculptor, who hailed from much later period, hid the genetalia of his idols and figurines, as it was repugnant to his sentiments. He mostly used leaves and twigs for this purpose, which by no standard of imagination can ever form an apparel. The passionate values attached to nudity are a modern concept. Even today, if cattle and all animals in nature can move freely unmindful of their nudity, why not their counterpart the Man.

Breeding (Productivity)

Breeding has its base in sexual behaviour, while sex instinct is a harmonal effect. Under these physiological conditions, both male and female animals can move about freely. Their sex vigour is only accentuated when the female is in oestrous cycle. After the harmonal heat disappears, the sex vigour abates in both ; and their normal life begins The un-predictable sexual vigour, noticed in the modern man, is either an evolutionary mutant or a vitiated natural living. Thus it should not be mistaken for the natural way of life. In that phase, both animal and human behaviour were identical. If we can successfuly subtract the emotional aspect from the natural physiological behaviour, the problem gets automatically solved.

Self preservation

Another cultural character is instinctive self preservation which is common to all animal world. It has no history of beginning or end. Sanskrit scholars mention food, sleep, fear, and sex (Ahar, Nidra, Bhaya, Maithuna) as instincts. Even the modern civilised world is not free from this behaviour. In nature, each species is endowed with its own means of offence and defence. If cattle gore their opponent by horns, horses would kick back with their hind legs. Dogs are fierce biters while wild carnivora are renowed maulers. If these means fail death is the next sequel.

Self decoration

Decoratng once own body appears to be another instinctive cultural character. This appears to have come into practice since the beginning of the world; and is handed over to the posterity. Not only the prehistoric human society indulged in this, even the moderners are not free from this. How and when he learnt this, is unknown. The bony beads, excavated at Utnoor are a direct pointer to this situation. Whether the decoration was of the males, females or both is undeciphered. But, the carry over of this practice by the modern females, suggests the sex preference. The decorative material has undergone profound changes depending upon the availability of the source material. Sculptural evidence also supports this condition. Hence, it is a historic legend of scientific nature.

Usually, there are two types of bone beads, one long and the other short and rounded ! ....They preferred jaw part without moalars, which has the advantage of having a bore naturaly.

Karnataka of prehistoric period

It is wrong to claim the part of the Indian territory as Karnataka, when provincialisation did not exit. All that could be deciphered is that it is a habitation site, where existence of man and animals could be traced. When I state 'Prehistoric Karnataka state' the connotation is that the country now called as Karnataka, was then a habited place.

Hallur, one of such habitation site was excavated by Dr. Nagaraja Rao, now Director General of Archaeology, New Delhi. The excavation of the two trenches showed that the earlier occupation of the site was during the neolithic period circa 1800 B.C. much earlier than the period of Aryan invasion of India. From the faunal remains, I identified the presence of horse on the locale. As it went contrary to the recorded evidence that Aryan brought the horse along with them, while invading India, it did not gain universal acceptance. In this predicament, they ordered a second excavation near the same site, which also revealed the presence of horse. The matter is still subjudice. Whatever may be the argument, it is imperative that history has to be reconciled. I have dealt with this problem in detail (KHRS Vol XIII)

This situation has arisen, only because there does not exist an organisation to conduct faunal studies. There is neither a laboratory nor a museum to collect skeletons of wild fauna, for comparative studies. The archaeology department which conducts excavation is left with no source to get the faunal collections studied. The universities in Karnataka which have a factulty for

Archaeology, only specialise in teaching and not in its fundamental research.

Unfortunately, this situation is not limited to the Indian continent only. Foreign countries too, are in the same predicament.

'During the process of archaeological excavations, both in this country and abroad many thousands of animal bones are recovered during the course of a single year. Much of the material is buried again without examination, by those best qualified to do this; and that which is retained is all too often devoid of the date of association which makes it valuable to the animal Historian' (Remond Chaplain; 1965).

I have also given hints for bone collection and discard, their processing, packing and despatch to help the excavating archaeologists (1978; p. 417).

It may appear paradoxical that a picture of human society should be drawn from the study of animal remains. Out of the two live agents of the society, man was beneficiary, while animals were his beasts of burden. Except skeletal evolutionary changes, man has not left behind any other sources of information. Animals, which provided him with food, with tools, with ornaments bear all the symptoms for assessment of human society, regarding his physique, his source of food and its procurement, methods adopted to make it edible, his tool resources for extraction of the same. I am not aware of any other material, which can throw light on this aspect. With improved technique, it is possible to assess the climatology ecology, rainfall, nature of terrain density of the forest etc. All this is denied to the archaeological world for want of laboratory facilities and technically trained staff. I have not mentioned the above facts for propagating the cause of the study of archaeo-zoology but for meaningful archaeology.

14. ON THE ORIGIN OF THE MALWA CULTURE OF THE MAHARASHTRA

S. A. Sali

INTRODUCTION

In a section of Indian archaeologists two views are current on the foreign origin of certain culture-traits in the past Indian cultures, one pointing towards West Asia (Sankalia, 1973 : pp. 86-91) and the other Southeast Asia (Sarma, 1972 : pp. 95-112). According to the latter, "throughout (even during the early stone ages), the protohistoric and historic times, developments in Southeast Asia and China sooner or later reached India" (Sarma, 1972, p. 103). It has also been suggested that "The Eastern 'cradle' is as early as Western, perhaps much more earlier and independent to begin with. India is sandwiched between them" (Sarma, 1972 : pp. 110-111). The champion of the West Asian origin of the Malwa and other chalcolithic culrures is Prof. Sankalia (1973 ; pp. 86-91) the doyen among the Indian archaeologists. In fact he traces "colonization" in India right from the Stone Age times.

The discovery of very early food-producing cultures in the West and the East is the result of systematic and painstaking research. It appears to have forgotten that in a country so vast as India the areas investigatad in different regions were small and the objectives with which they were investigated were also of limited nature. The number of excavated sites in a given region has been very small and the excavated area also small. Besides, the excavations were primarily intended to obtain a sequence of cultures. For the interpretation of particularly Stone Age evidence our reliance has been chiefly the surface material–especially stone tools–rather than that obtained from the excavations of primary or living sites the necessary of which has been felt only of late. And last of all information about the early food producing cultures he had only when contemporary botanical remains are obtained. Thus, because of such limitations the information obtained is also limited. Inspite of all these drawbacks, however, the available information in our country is not discouraging. In fact the following selected examples from Indian archaeology seem to suggest that the above mentioned views are hasty conclusions arrived at without making a proper search in our country.

In the excavations at Patne in Jalgaon district of Maharashtra (Sali, 1980 : 1985 : pp. 137–145) use of food-grains, perhaps of wild variety, in the diet of the Upper Palaeolithic people of Phase II D as early as 20000 years Before Present was attested to by the presence of stone saddle querns and mullers. What has been termed by the excavator as Late Mesolithic (Sali, 1980) showed advanced traits such as the presence of hearths, burnt floors, post–holes, charred wood, fired clay lumps, etc. The evidence from Adamgarah (Joshi, 1978) leaves no doubt that Mesolithic man there domesticated dog, cattle, sheep/goats and pig around 5000 B.C. It may by recalled that some thirty years back (late Subbarao, 1955 ; pp. 126-49) had propounded a theory that the crested-guiding–ridge technique of blade–production originated in Jericho in West Asia and it was from there that this technique was transmitted through the settlements on the Iranian plateau to the Indian Chalcolithic cultures. The excavation at Patne has amply made it clear as to how premature the theory was when evidence of prolific use of this technique was obtained from the Middle and Upper Palaeolithic and the Mesolithic levels (Sali, 1980, 1985 ; pp. 137–145) After reviewing the evidence about the arrowheads of copper and stone of concave based and barbed varieties from Indo-Pakistan sub-continent and the West and the East in the light of the discovery of similar types of copper arrowheads from Phase II of Bagor in Rajasthan, Misra (1970, p. 231) concluded : "(2) Stone prototypes of metal arrowheads are completely absent from the Indo-Pakistan Sub-continent (3) The main concentration of stone prototypes is in the Caucasus, Europe and Africa. (4) Finally, the Indian examples, both pagorean and Harappan, must originally have been inspired from the western world............" In this connection, it should be pointed out that stone arrowheads of the types dealt with by Misra have been found at Patne and Daimabad in the Upper Palaeolithic and Mesolithic deposits (Sali, 1972 ; pp. 180 1985 ; pp. 137–145). (Pl. I Fig. 1) One example of the concave-based type in stone (Pl. I. 4; Fig. 1. 4) was collected at Sihonia in the Chambal basin in Morena district of Madhya Pradesh by Bhadoria of the Archaeological Survey of India (Per com.) Such types, both in stone and bone, continued to be used in the Chalcolithic times as at Daimabad (Sali, (c) in press). These examples may be enough to caution against getting obsessed by the idea of seeking origin of each and everything in the past cultures of India in the West or the East or the South-east.

The Malwa culture has figured very often in the context of foreign origin. Before, however, discussing this issue and making a suggestion about the probable origin of this culture it is proposed to outline the evidence of this culture obtained in the excavations at Daimabad conducted from 1976–79, for, this is the only site in Maharashtra which has been excavated on large scale to obtain, amongst other objectives, information about various aspects of this culture (Sali, (c) in press).

2. The Malwa Culture At Daimabad

The Malwa culture at Daimabad represented Phase IV, the overlying culture of Phase V being the Jorwe Culture and the preceeding ones in descending order the Daimabad culture (Sali, 1983 ; pp. 128–152) as Phase III, the Late Harappa culture as Phase II (Sali, 1977 in press, 1982 ; pp. 175-184, 1984 : pp. 235–242) and the Savalda Culture as Phase I (Sali, 1965 ; pp. 207–210 in press, (c) in press). It has been dated from *circa* 1600 B.C. to 1400 B.C. The settlement of this culture covered approximately 20 hectares area. The culture settled at Daimabad in its fully developed form and allowed its predecessor, viz,, the Daimabad Culture, to live with it for some time as was indicated by the overlap between the two.

The Malwa Ware, characteristic of Phase IV, made on a wheel by using paring technique, treated with a slip showing red, orange, pink and yellow colours and their pleasing shades, on the whole of medium thickness, there, however, also being thicker and thinner varieties, was painted in black colour. The designs can be classified into five major groups : (1) geometric ; (2) animal and other motifs, (3) naturalistic scenes ; (4) schematic, and (5) the so-called potter's marks. Amongst these the last-named group, the most important in the present context, is a class by itself and had been recognised for the first time at Daimabad. These marks continued to occur on the Jorwe Ware of the succeeding phase both were not present on any of the painted Wares of the preceding phases. These marks included solid dots, star with solid pillets at the end of each line, astrick mark or a star, horizontal strokes, V-shaped mark, an arrow, plant, etc.,

The important types in this ware were

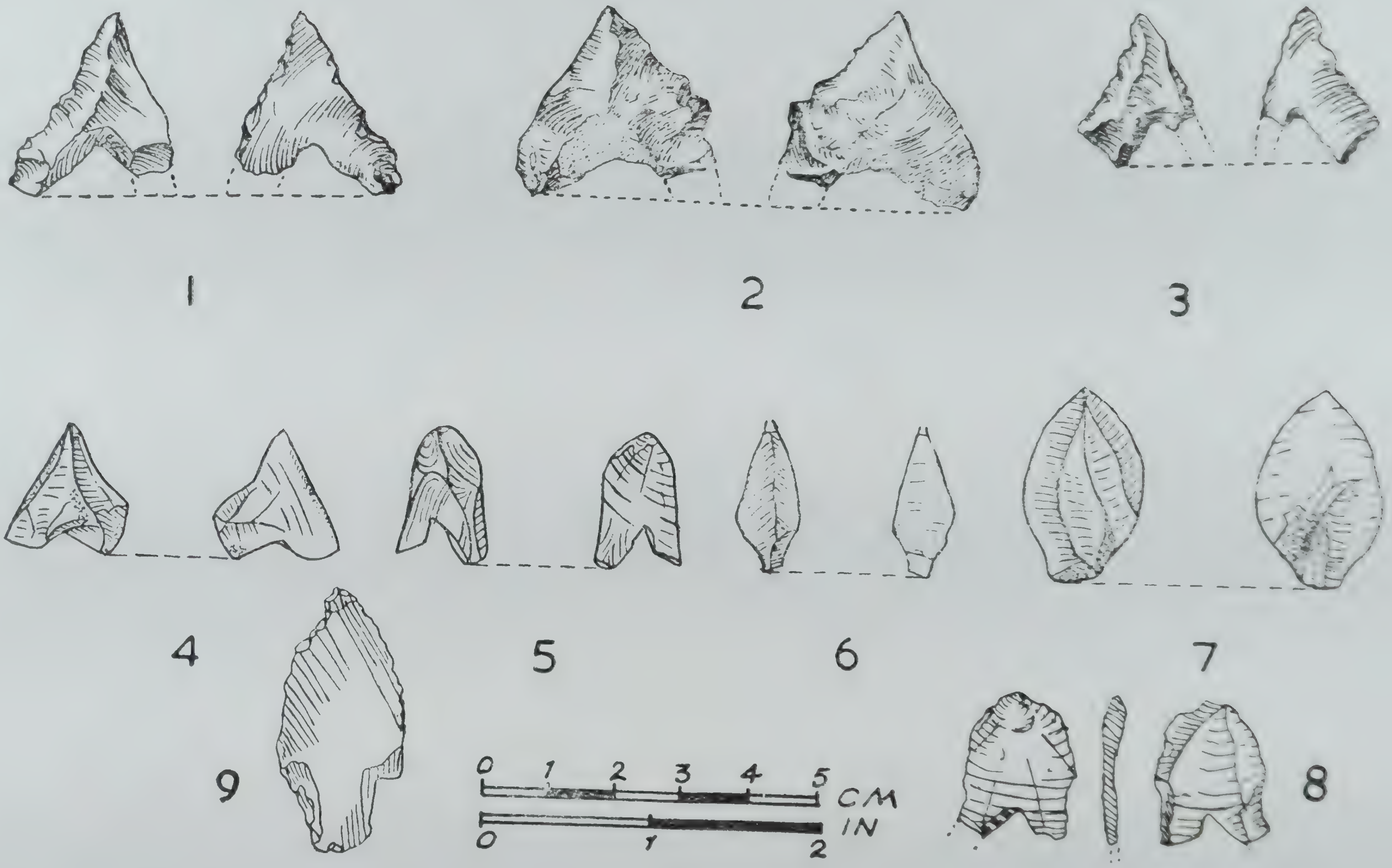

Fig. I

Notched and tanged arrowheads of stone : No. 4 from Sihonia, Madhya Pradesh; No. 5 from the base of a cliff-section on the river Pravara at Daimabad; all the rest from Patne, Maharashtra (No. 4 was collected by Shri. Bhadoria and No. 5 by a trainee from the Calcutta University).

handi with bluntly carinated body, funnel-shaped mouth and with or without tubular spout, concave-sided carinated bowl, bowl with incurved sides and tubular spout, *lota*, *chambu* with bottle neck, vase with corrugated neck and bowl -or dish-on-stand. The spouts were of tubular and channel and lipped types, the first two being luted to the body.

Graffitti marks were present on the Malwa and the Burnished Grey wares, those on the latter being in exceptionally large number. While majority of the marks were common to both the wares, the graffitti-marks on the flat top of lid-knobs was a distinct feature of the latter which was not noticed in any other phase.

The exposed structural remains have been grouped into five broad categories, viz., (1) workshop, (2) draftsman's house, (3) priest's house, (4) religious and (5) unclassified. Among the priests houses, located in a religious complex, special mention should be made of a *Wada* consisting of three rooms of almost identical dimensions ranging from 3.7 m to 3.9 m in length and 2.4 m to 2.5 m in breadth and which appeared to belong to a single owner—perhaps a head-priests—as was indicated by the presence of three types of fire altars, Heart-shaped, Ovaloid Sunken, and Oval, in their premises.

Unique were the religious structures comprising a large mud platform and different types of sacrificial altars, of unusual interest among these latter being the Apsidal sacrificial Temple, the form of which reminded one that of the Buddhist *Chaitya griha* of the historical period. The provision of a channel to spill the ablution water into the soak-pits filled with gravel and lined with clay rings was a unique feature of the mud platform which was meant for congregation. The clay used in the construction of the mud platform and the sacrificial altars was bereft of coarse material and was as fine as that of anthill and recalls the use of anthill earth in the construction of sacrificial altars during the Vedic period (Keith, 1925, p. 397).

Of exceptional interest was the evidence of sixteen burials divisible into two main groups, I urn-burial and II pit burial, each group represented by two main types, A and B, and C and D respectively. In Group I, the type A was a horizontally placed double-urn burial in north-soufh orientation with two sub-types A i and A ii, the latter having two variants, Aiia and Aiib. In sub-type Ai urns of burnished grey ware were placed mouth-to-mouth. Sub-type Aii differed from the above in having placed the mouth of one urn in that of the another and in variant Aiia both the urns were of burnished grey ware whereas in the variant Aiib one of the urns was of the Malwa ware and the other of burnished grey ware, both enclosed within a clay packing. The smaller urn, placed in the mouth of the bigger one, was on the north. The type B was a single-urn burial with four sub-types. In sub-type Bi the urn was of the Malwa ware, placed vertically, its mouth covered with the bowl of burnished grey ware in inverted position. Sub-type Bii was represented by a small vase of burnished grey ware covered with a lid of the same ware while in sub-type Biii in the mouth of the horizontally placed urn of burnished grey ware a deep bowl of the same ware was placed in the same position, both lying in the north-south orientation. Sub-type Biv was symbolic, the urn containing no remains. The Type C in Group II was the pit burial containing bowls and the Type D was a symbolic burial. An interesting aspect of the burial of Types C and D was that the bottom of the pit was covered with twigs of fibrous plant, in one example the bowls being also covered. This recalls mention of spreading *darbha* in the burial pits in the *Gṛhysutra* texts (Dange, 1979; pp. 72-74).

The people of this culture produced both the winter (*Kharif*) and the summer (*Rabi*) crops. Charred remains of Wheat, Barley, Ragi, Lentil, Horse Gram, Beans, Hyacinth bean, Grass Pea, Black Gram, Green Gram, Cheno/Ams, Tarla, Sugandha Bela, Ber and Cordata seed were recovered from the levels of this culture.[1]

Among the other finds were included microliths and objects of copper including a tanged arrowhead with a mid-rib, bone and stone and beads of steatite, carnelian, shell and terracotta.

A stone sculpture of *Siva*, made on an oval-shaped trifaceted stone by engraving eyes as full circles or goggle eyes and moustaches, deserves special mention (Sali, (b) in press). *Siva* was also represented in applique on pottery (Sali, (b) in press). A figural schematization, representing a stage in the development of *Sakti* cult is also of great interest (IAR, 1978-79, Fig. 8, 1-5). On either side of a tubular spout of a carinated *handi* with funnel shaped mouth and of the bowl with incurved sides occurs painted design which when looked from the front facing the spout suggests a figural schematisation of a female with her thighs stretched apart and the male penis inside the vagina, the vertical painted pair of lines on either side representing the perineum and the connected concave curved lines the buttocks. It thus conveys the idea of the union of the Linga and the Yoni.[2] It seems likely that the stone stump and the clay stump in the firepits of the sacrificial altars convey the same idea.

The evidence of sacrificial altars leaves no doubt that the authors of the Malwa culture were followers of Vedic religion. It is not as yet certain that the authors of the preceding Savalda, Late Harappan and Daimabad cultures at Daimabad were the followers of Vedic religion. Until, however, it is proved so, it may be said that the authors of the Malwa culture were the first people following Vedic religion to settle in *Dakshinapradesha* in *circa* 1600 B.C. This also reminds one the story of sage *Agastya* who crossed the Vindhya. A legend current in the region is that the sage *Agastya* established his *ashrama* or hermitege at Akola on the river Pravara about 35 km upstream of the famous site of Jorwe. It is not unlikely, this legend may be a real remnant of a historical fact.

It is believed that the authors of the Malwa culture arrived and settled in Maharashtra from Madhya Pradesh. There, however, appear a few differences between this culture in these two regions. The pots with tubular spouts are absent in the Malwa Ware in Madhaya Pradesh and none of the excavated sites in that region revealed evidence of burials in the levels of the Malwa culture.

The outstanding features of the Malwa culture revealed at Daimabad may be summarised as under :

1. The Malwa Ware was painted with, besides geometric and other designs, also the so-called potter's marks ; and pots with tubular and channel-spouts were present in it.

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[1] Kindly identified by Dr. M. D. Kajale of the Deccan College, Pune and Dr. VIshnu Mittre of the Birbal Sahni Institute of Palaeobotany, Lucknow. I am thankful to them.

[2] It may be recalled that the sage *Agastya* was known as *Kumbhayoni*.

2. The people of this culture were followers of Vedic religion. *Saivism* and *Sakti* cult also played an important role in their life.

3. They practised various methods of burying the dead, one of them being the double-urn type child burial.

4. These people know the apsidal and *chandrashila* forms in the structures.

3. On The Origin of the Malwa Culture

On the origin of the Malwa culture Sankalia, (1973: pp. 86-91). pointed out: "Another group with a distinct pottery settle down at Kayatha and other places in the Chambal Valley and its tributaries in Madhya Pradesh................From these settlements, perhaps, developed the Malwa or Navadatoli culture. Still at no site can we show that this developed locally from purely indigeneous elements. Hence, with its distinctive pottery forms such as goblets, channel-spouted bowls, and some of the painted designs, which distantly recall those of Western Asia and Iran, there is no alternative but to regard this manifestation as a kind of colonization, a mixing of the foreign-oriented with the idigenous, leading to the development of the characteristic second millenium B. C. cultures of Central India" (p. 89). He further added: "The story seems to be similar in Western Maharashtra. Here the evidence is a little more positive and varied. Besides the vertically spouted pots, which vaguely recall those of Western Asia, we have theriomorphic bulls from Nevasa and Chandeli, and mother goddess figures from Nevasa and Inamgaon. And then there is the custom of burying the dead under the floor in the living house, children in two or more urns, adults in a pit, oriented north-south. The theriomorphic bulls show close parallels with those from Sialk and Nuzi and the mother goddess with and without a head, with many in Western Asia, but particularly at Catal Huyuk". (p. 89).

In Sankalia's above quotations one finds that he, on the one hand, postulated the origin of the Malwa culture in the Kayatha Culture and, on the other, just because he was unable to show a local development, he has taken a recourse to tracing the origin of this and other chalcolithic cultures of Central India and Western Maharashtra in West Asia. It is not possible to comment on his unconvincing views in detail in this paper due to the restriction on the number of pages. Yet, it needs to be mentioned here that his approach suggests that he has taken it for granted that no more archaeological research was left to be done in Madhya Pradesh or any other part of our country for tackling this problem.

The excavations undartaken so far have brought to light remains of mainly the Kayatha, the Ahar and the Malwa cultures. The Jorwe Ware, the lustrous red ware, the Daimabad Ware (Sali, 1983 : pp. 128-152) and what has been named as Runija Ware (per. com from Dr. Wakankar) have also been obtained. But these do not seem to complete the picture of the Chalcolithic period of Madhya Pradesh. The present situation may be said to be, more or lees comparable with that which prevailed before 1957 in Maharashtra. It was after this year that the well-planned detailed explorations in the Central Tapi Basin brought to light Harapphn settlements (Sali, 1970 ; pp. 93-101 ; 1977) and the discovery of the Savalda culture (Sali, 1965 ; pp. 207-10 ; (a) in press) was made and thus existence of two more chalcolithic cultures in the region was recorded much to the surprise of a number of archaeologists (and, it seems, also to the dislike of some)[1] who firmly believed that the Jorwe and the Malwa were the only two chalcolithic cultures that flourished in the region. And it is now a well-known fact as to how patiently and carefully conducted excavations at Daimabad added to the list one more culture, the Daimabad culture (Sali, 1983; pp. 128-152) and enhanced our knowledge about the five Chalcolithic cultures of the region exposed for the first time in a stratified context. In the light of the experience in Maharashtra it appears very much necessary to undertake systematic explorations in Madhya Pradesh in order to know the spread of the chalcolithic cultures and to discover those so far unknown. And there seems to be ample scope for such explorations as the experience of this author suggests. Within a couple of days he could discover as many as six late Harappan sites and one Neolithic site (IAR, 1981–82; pp. 31–32) in the Chambal basin. This would mean that there is much more in this region than that meets the eye.

Perhaps, no one has made any attempt to seek evidence for the origin of the Malwa culture in the close by state of Haryana at least this author is not aware of any. But this is felt absolutely nececsary in view of the similarities observed by this author between the black-on–red ware from the excavated site at Khatoli in Haryana and the Malwa ware of Maharashtra as explained below.

The site at Khatoli (Lat 28° 5′ N Long 76° 15′E) in district Mahendragarh of Haryana, situated on the eastern bank of the river Sahibi was excavated by R. P. Sharma (1982 pp. 123–125) of the Archaeological Survey of India. The following observations are based on the examination of the excavated pottery so kindly allowed by the excavator and Dr. Margabandhu for which the author is highly thankful to them.

The pottery from the lowest layer (6) is mostly handmade and coarse and appears to belong to the Neolithic rather than Chalcolithic. This may be designated Khatoli I.

There appears to be a cultural gap between Khatoli I and the culture represented in the overlying layer (5), that is Khatoli II. The pottery of this layer is of great interest to us as will be explained below.

The cultural material from layers (4) and (3) belongs to the Harappa culture. This is Khatoli III. The layers (2) and (1) yielded O.C.P. which may be called Khatoli IV.

The main bulk of or the characteristic pottery of Khatoli II is a black–on–red ware which betrays a number of features akin to those of the Malwa Ware. Made on a wheel by using paring technique, it is of medium fabric and treated with a slip which has turned red, orange, pink, yellow and their pleasing shades. The surface of a small percentage of sherds shows a lustre due to burnishing. The types represented in this ware were bowl, perforated vase, dish (perhaps dish-on-stand) and a vase with a high concave neck. A fragment of a tubular spout was also present. The ware is painted in black with horizontal bands, sometimes thick, groups of oblique lines and crinckled lines (Fig. 2). But the most interesting painted designs were the so-called potter's marks, one of them being an empty oval and the other a V-shaped mark, all painted on the outside. It should be mentioned that similar marks occur on the Malwa and the Jorwe Wares in Maharashtra. These marks also are to be found on the Malwa Ware of Madhya Pradesh but they have not been recorded as such. It needs also to be mentioned that 'potter's marks on pottery have not so far been reported from any of the sites in West Asia. In India too they are one of the characteristic features of only the Malwa and the Jorwe Wares, so far as the present evidence goes.

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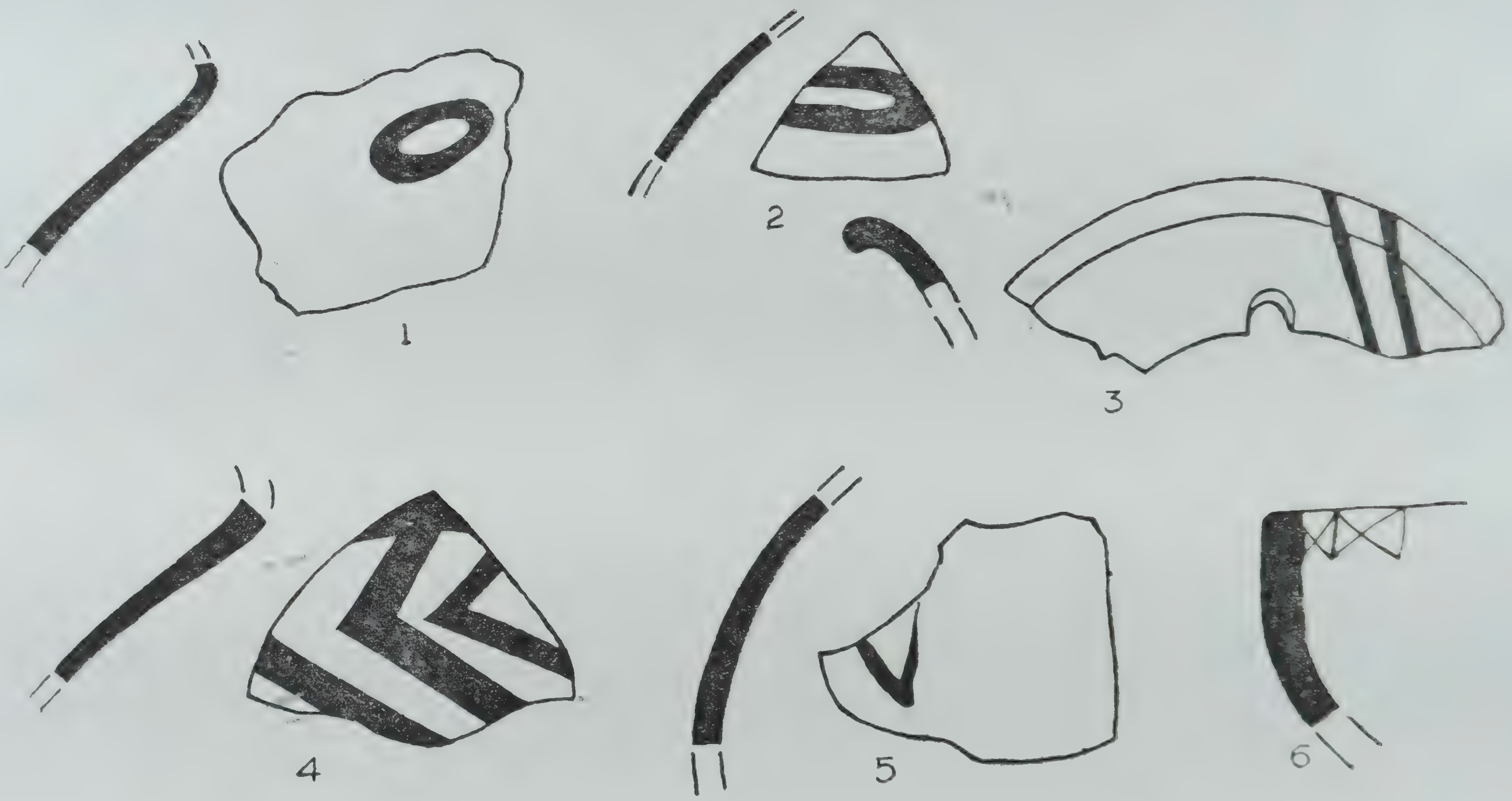
[1] In this connection I would like to take an opportunity to point out of selected examples of how attempts were made to ignore the discovery of the Savalda culture. In his book *The Archaeology of India,* after wrongly thrusting excavatorship of the site at Savalda on me, Agrawal (1982) arrived at a conclusion that "on the basis of the available evidence, it is difficult to assign any cultural affiliation to this culture" (p. 234). It is also very sad that Agrawal should quote incorrect sequence of cultures at Daimabad on p. 235. The most fanciful approach was however, that of Chakrabarti (1980; p. 166) who did not even make a mention of Savalda culture while detailing and that too wrong, sequence of cultures at Daimabad. Perhaps he did not feel it worth mention.

Associated with the black-painted red wares described above, were the burnished grey ware and all-black burnished ware, of the latter there being only a few examples. The burnished grey ware of Khatoli II also shows similarities with that found associated with the Malwa ware at Daimabad.

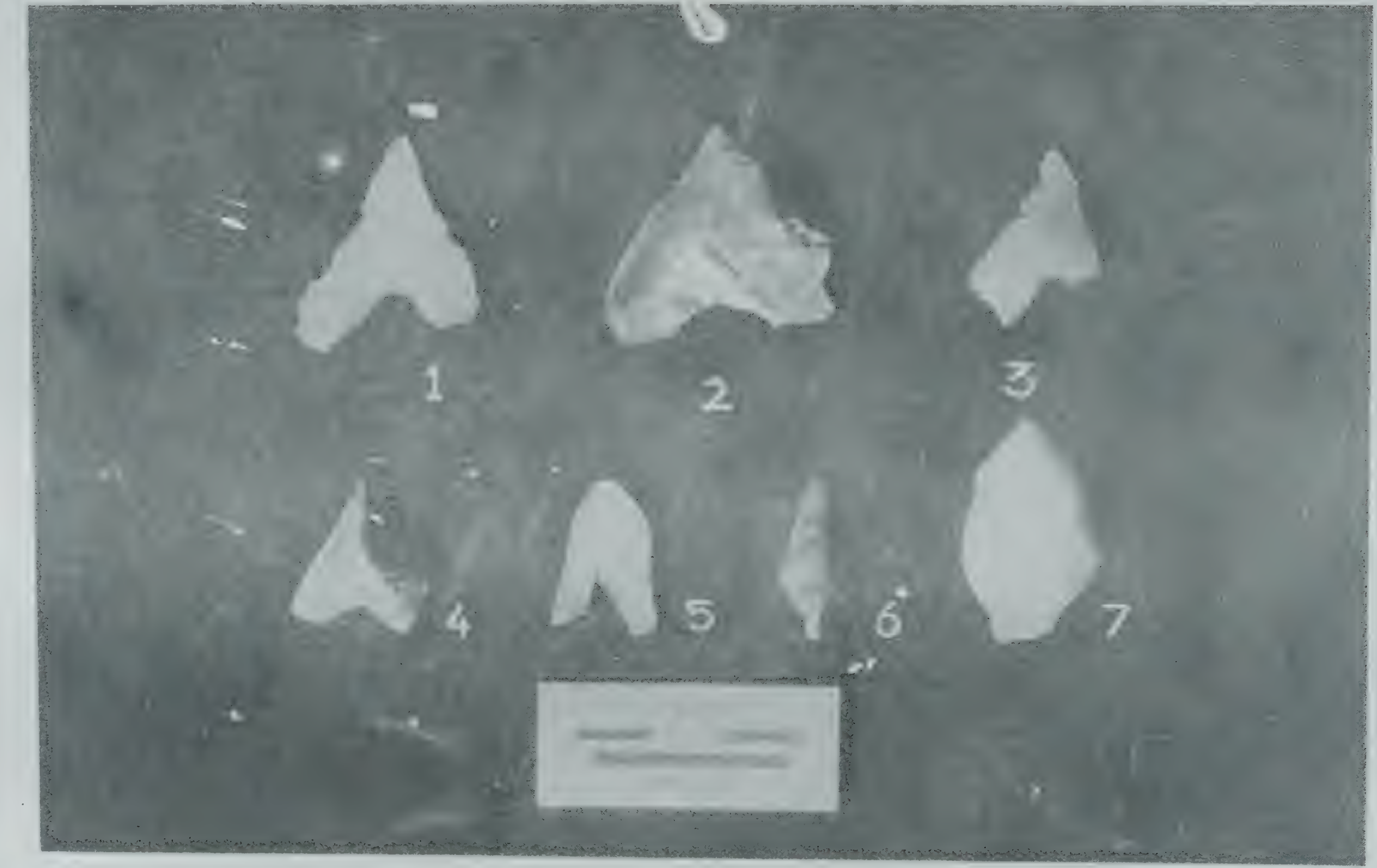
The excavator has said that ''the pottery of layers (5) and (6) is rolled and as such it is a re-deposited material'' (Sharma, 1982; p. 125). But this author has not seen any rolled pottery. Similarly, the black-and-red ware was also not seen in any of the assemblages.

The excavation at this site was conducted on a very small scale. It was just a trial pit. But has provided valuable clues for understanding a vital problem of origin of one of the Chalcolithic cultures of Peninsular India. It would therefore be worthwhile to undertake further research with a view to know more about the Khatoli II culture.



KHATOLI, DISTRICT MAHINDRAGARH, HARIYANA: BLACK-ON-RED WARE, LAYER-5

Fig, II



Pl. I Notched and tanged arrowheads of stone; No.4 from Sihonia Madhya Pradesh, No.5 from Diamabad and the rest from Patne

15 SOME ASPECTS OF THE BIHAR KARNATKA CHALCOLITHIC COMPLEX

Sita Ram Roy

The students of archaeology tax their mind when they study the chalcolithic complex of the States of Bihar and Karnataka simultaneously. The elements of cultural traits belonging to the concerned period of these two regions are self-explanatory in this regard. The ceramic industry, particularly that represented by the black-and-red ware, seems have played an important role during the period, under review. The date of this pottery in both states is more or less coeval and its other common feature includes the plurality in the shapes of bowls (Srivastava, 1971; p. 392). The third similarity in this ware of both these parts is represented by an irregular line made by the black on the upper part of the exterior of the rim (Srivastava, 1971; pp. 381-382). But it is surprising that this ware, which is a chalcolithic pottery in Bihar, (IAR, 1956-57 to 72-73) is found in the region of Karnataka in the neolithic or megalithic context (Nagaraja Rao, 1965) (Sundara, 1968; pp. 1-25) and never with the chalcolithic complex. The chalcolithic black-slipped ware of Bihar deserves mention with reference to its counterpart associated with megaliths in southern Karnataka. Among the associated antiquities, microliths on agate and chalcedony, bone styli and copper objects, discovered from the chalcolithic level at different sites of Bihar, can well be compared with those picked up from the northern part of Karnataka (Srivastava, 1971; pp. 395-97). So far as the paintings on the black-and-red ware are concerned, the samples found from Bihar and northern Karnataka showed a few common designs represented by groups of dots and dashes, although executed on both sides of the evidences in Karnataka and only on the interior of the examples in Bihar (Srivastava, 1971; pp. 395-97).

Let us first present a short picture of the chalcolithic complex in Bihar. Hitherto five sites represented by Sonpur (IAR 1956-57) and Taradih (IAR, 1981-82) (both in district Gaya), Oriup(IAR, 1961-69) (district Bhagalpur), Chirand (IAR, 62-65, 68-71, 72-73) (District Saran) and Chechar (IAR, 1977-78) (District Vaisali) have been discovered. Mention may be made of the fact that these sites along with a few more such suspected ones are located nearby big or small perennial rivers from which their inhabitants got easy supply of water. Sonpur is situated on the bank of the Jamuni river; the Ganga is flowing by the side of Oriup and Chirand; Taradih is near by the Falgu river and Chechar is located just close to the Gandaka river. Needless to say that these sites, as a result of archaeological excavations, yielded such evidences as clearly reflected some of the aspects of the chalcolithic character of Bihar.

The archaeological field researches revealed that the chalcolithic people of Bihar made their dwellings of mud-plastered reeds or bamboos. The discovery of the chunks of clay with the impression of reeds and bamboos in considerable numbers from the chalcolithic layers at Sonpur and Chirand bears testimony to this fact. At Chirand (IAR, 1963-64, p. 52) these dwellings had their floors made of burnt earth at Sonpur (Sinha & Verma, 1977; pp. 6-8) they had lime-floors and circular pits as is evidenced by such discoveries at these sites. The chalcolithic circular pits of Sonpur represented the shapes of contemporary huts of different dimensions; their diameters varied between 1.84 and 2.44 metres and they showed maximum depth of 8 centimetres. Since the archaeological operation was conducted in a limited area at Chirand, the plan of the chalcolithic dwellings could not be ascertained. Still this can be said with certainty that the chalcolithic dwellings at Chirand were bigger in dimension than their neolithic counterparts as was evidenced by other details brought to light by archaeological excavations(IAR, 1972-73; p. 125). The evidences for chalcolithic dwellings at Chirand also included a few post-holes and a circular hearth revealed at the earliest level at the site (IAR, 1968–69). The excavations at Taradih revealed a 70 cm. deposit of the chalcolithic phase, which was composed of yellow compact alluvial earth just above the virgin greyish yellow soil. The deposit showed the evidences of a contemporary rural economy which reflected the life of the then inhabitants of the site. Even now they did not depend on agriculture alone, but hunting and fishing also contributed to their livelihood. They made their dwellings of wattle and daub. The other evidences come across at this level at Taradih included a fish hook of copper, a carnelian blade and ovens of different sizes (IAR, 1981–82).

The discovery of bones of animals and birds from the chalcolithic pits at Sonpur and bone pieces of birds and fishes in association with other finds from the contemporary regular strata (Sinha & Verma, 1977; pp. 6–8) bears witness to the above mentioned contention of the contemporaneous non-vegetarian food-habits. The cereals, which the chalcolithic people of Bihar produced and consumed, included rice, wheat, barley, munga, masura etc., as is inferred from the discovey of these cereals in charred condition and a few burnt clay pieces with the impression of the husk of the paddy from the neolithic level of Chirand. It was but natural that the immediate successors (i.e. chalcolithic people) must not have been ignorant of the activities and food-habits of their neolithic predecessors. The discovery of five kilograms of charred rice in a handmade jar from a chalcolithic post-cremation burial bears testimony to the above contention.

The evidences from Chechar, although did not include any metal object, still showed other representative aspects of the chalcolithic complex. The dwellings of the contemporary people and human activities for livelihood seemed alike with their counterparts discovered from the chalcolithic level at other sites in Bihar (IAR, 1977–78; pp. 17–18).

The chalcolithic ceramic industry of Bihar also did not lag behind. Its contemporary potters successfully made kiln-burnt plain and painted examples of black-and-red, black, steel-grey and red wares. The potsherds, picked up from above mentioned different sites, represented both hand-made and wheel-turned specimens. They were made of sandy earth and had thick slip, and their sections were usually porous. The available ceramic examples at Chirand showed that they were of different shapes which included dish-on-stand, long-necked jar, lipped bowl, basin, bowl-on-ring base, spouted vessel, perforated pots with four legs or ring base, lipped jug, trough, dish, bowl and elongated lipped bowl in black-and-red and red wares, three-legged perforated bowls in red ware and straight high-necked and corrugated shouldered lotus in black slipped and black-and red wares.

The chalcolithic black-and-red pottery of Bihar showed painted designs on its interior alone. The specimens from Chirand, represented by bowls and dishes in black-and-red ware, showed painted designs in groups of dashes or wavy or straight lines executed in white on black surface, while the vases had paintings in creamy white on their necks and shoulders. A few examples of the black ware also showed paintings in white. A few sherds represented by a shoulder-portion in red-slipped ware from Sonpur possessed painted dots creamy in colour (Sinha & Verma, 1977; p. 21). Besides, a white painted fragment of a channel spouted bowl in black and-red ware from Oriup deserves special mention. The specimens of stems of the dish-on-stand in black-and-red ware from Chirand were both plain and corrugated while a few examples in the same ware from Sonpur were incised and grooved just below the rim.

Of the ceramic evidences from Taradih special mention may be made of dish-on-stand, pedestal-based bowl, bowl with ring-base and perforated bowl in black-and-red, red and black wares showed painted designs of wavy lines, straight or oblique strokes and dots executed in white.

The chalcolithic people of Bihar knew the use of copper, but the negligible occurrence of copper objects bears witness to the fact that this metal was considered very costly and the existence of coppersmiths was also negligible. The discovered copper antiquities included a few corroded pieces from Sonpur and Chirand, one bead from Chirand, a bangle from Oriup and a fish-hook from Taradih.

The microlithic tools discovered from the stratified layers at different sites in Bihar included cross, waste flakes, blades and numerous small nodules on carnelian, chalcedony, quartz and chert. The discovery of tanged and socketed arrow-heads with circular or square section, bone pins and arrow-heads, styli of bone and ivory from the chalcolithic level of Sonpur and Chirand and socketed, tanged and barbed arrow-heads, points and chisels of bone from Taradih well indicates that the chalcolithic people of this region of India were not only the users of these objects as hunters but were also the makers of those artifacts. Besides, a few terracotta stone beads were also found in association with other chalcolithic objects ; the terracotta beads were pear-shaped and had incised decorations. The stone beads of various shapes, made on steatite, chalcedony, etc. were discovered in considerable numbers. It seems that there were two classes of bead-makers ; the terracotta beads were probably made by potters themselves, while the stone specimens were manufactured by a particular class of artisan. There were some other classes of artisans who made stone balls, pestles, querns etc. with which the chalcolithic people of Bihar pounded their corns. It is worth noting that the neolithic celts were also discovered from the chalcolithic level in Bihar. When copper implements were negligible and iron was then not introduced, and at the same time agriculture was progressing apace, the neolithic celts naturally continued to be used by the chalcolithic mass for cutting jungles and tilling lands.

The discovery of chalcolithic post-cremation (Sinha & Verma, 1977; p. 8) burials at Sonpur and a suspected such burial at Chirand (IAR, 1968-69) bears witness to the fact that the contemporary people of Bihar burnt their deads and buried their charred bones. The burials at Sonpur were circular on plan and had diameters of 1.82 to 2.12 metres and depth 91 centimetres.

It is worth mentioning that slags of iron appeared at the uppermost level of the chalcolithic strate at Chirand and Sonpur. The earliest chalcolithic level at Chirand(IAR 1968-69) was dated by C^{14} to 3600 B. P. (T. F. 445) and that of Sonpur may be (Sinha & Verma, 1977; p. 13) assigned to a period between 1100 B.C. and 650 B. C.

We now proceed to cast our glance at the chalcolithic complex of Karnataka. In Karnataka there is some difference between its northern and southern complex ; the former presents chronologically an earlier character than the latter. Tekkalkota, Hallur etc. represent the northern region while Maski, Brahmagiri, Sangankallu etc. are the representatives of the southern one.

The sites of Tekkalkota (District Bellary), (Nagaraja Rao :1965). Hallur and Kunbev (both in District Dharwar) throw a significant light on the present study (Srivastava, 1971 ; pp. 395–97). Besides other traits, the black-and-red ware found in the neolithic burials at Tekkalkota seems comparable with its counterpart reported from the burials at Tekwada (District Jalgaon, Maharashtra) in the chalcolithic context (Srivastava, 1971 ; pp. 395–97). Burials of both the sites showed no difference in them. When the shapes of the pots and paintings executed on them seemed almost identical. The other associated finds represented by copper objects, microliths of agate, jasper and chalcedony, beads of shell, paste and semi-precious stones, bone styli and shell bangles, reflect the character of the regional chalcolithic complex. The painted designs, represented by obliquely converging lines in groups of dots, dashes vertical and oblique strokes, herring bone and short meanders, and found executed in white on both the interior and exterior of the concerned ware deserve special mention (Srivastava, 1971 ; pp. 395–97).

The chalcolithic complex of the southern region of Karnataka has been studied in this treatise on the basis of the result from Maski (District Raichur) (Journal, Thapar : p. 4) and Brahmagiri (District Chitradurg) (Wheeler, 1947; p. 180 ff). The evidences from Maski included the throughout presence of microliths and the meagre occurrence of copper. The microliths were mostly manufactured on chert, but examples on agate, carnelian and opal were also picked up. The blade-industry without retouching dominated the whole complex. Types without secondary work, which included the asymmetrical flakes and parallel-sided blades, constituted 78.5 per cent of the total discovered implements including cores. The remaining 21.5 per cent microliths were represented by backed and serrated blades, lunates, trapezes, scrapers, worked points and burinlike tools. The hammer-technique, often assisted by controlled flaking, employed in manufacturing these tools bears witness to the fact that the authors of these microlithic tools were skilful manipulators of the rawmaterial. The discovery of ten hammer stones with flattened and in some cases battered surfaces deserves special mention. It is worth noting that the stratified layers of the chalcolithic complex at this site did not yield any polished stone tool. Thapar associated four specimens collected from the surface itself with the chalcolithic complex of Maski, because such tools have been found with microliths at Brahmagiri and Sanganakallu.

The excavations revealed that the use of copper was restricted; the copper specimen found was represented by a rod of indeterminate use. Still the use of stone tools seemed dominant in all works, which clearly reflected that the metal infiltrated very slowly in an essentially neolithic culture.

Of the other associated finds, beads were predominant, the speimens of which were found on different materials represented by amethyst, carnelian, agate, chalcedony, coral, shell glass and paste. An exclusive shape represented by a concave sided square or star-shaped is noteworthy. Besides, terracotta objects included pottery discs which were both pierced and unpierced.

The ceramic industry was represented by dull grey and pinkish buff wares, which were plain in majority. These wares were mostly wheel-made; the handmade specimens were also available. The pinkish buff ware was found in greater frequency than its dull grey counterpart at the lower levels. The pottery showed coarse fabric and thin sections; its paste was the result of the micaceous clay being derived from decomposed shale or granite containing large particles of grit. It was normally slipped and occasionally burnished. The globular vase with flared rim and the trough with splayed out or everted rim were respectively typical of both industries. A few examples of dull grey ware showed incisions while about two dozens of specimens of the dull red ware had paintings in black or cholcolate colour; the executed designs included only linear patterns.

The animal remains found at this level clearly indicated the existence of the fresh-water mussel amongst invertebrates, and the vertebrates included common rat, short-horned humpless cattle, buffalo, sheep and goat. Of these animals, short-horned cattle and the sheep formed the largest number. The domestication of these animals indicated the pastoral economy of the contemporary people of the region tending towards food-growing one. The Zeuner's identification of cinder from the mounds of Kupgal and Kuditini as cow-dung and the existence of 'big bones of cattle' in the ash-mounds between Gaudur and Machnur near Lingsugur support the above conclusion. The discovery of spherical or spheroid stone balls bears witness to the fact that the chalcolithic inhabitants of the region were hunters too, who probably used spheroid stone balls as sling stones or bolas for killing fast-moving game.

Since the evidence of the plan of the chalcolithic houses and their building materials could not be found out, and since the post-holes and rammed earth flooring came across at this level, it is presumed that the chalcolithic dwellings were made of perishable material like timber.

No detarminable pollen-grains and tracheids were found to reconstruct the contemporary climatic condition of the region.

The chalcolithic culture or Stone Axe Culture of Brahmagiri was characterised by crude microliths of jasper, flint, agate, common opal and rock-crystal along with the throughout presence of the polished pointed butt axes of Trap rock. The copper objects were represented by a chisel and a rod being associated with a rod of bronze.

The ceramic industry was characterised by hand-made specimens having coarse grey fabric in globular shaped vessels. The lower strata of the chalcolithic level of the site yielded a few painted and incised sherds.

The chalcolithic level of Brahmagiri revealed two kinds of burials viz., (i) urn-burials for infants, and (ii) extended burials for youngs and adults

The post-holes, met with at this level, bore witness to the fact that the contemporary houses were mostly made of timber, occasionally supplemented by basic lines or low walls of rough granite blocks. The houses were probably of rectangular plan, because the post-holes were found in a straight line in one of the cuttings.

The chalcolithic level of Brahmagiri has been dated to the early first millennium B.C. to the second century B.C.

To sum up, the chalcolithic complex of Karnataka cannot be studied in detail without taking into consideration of the cultural traits of the neolithic and megalithic periods of the region. The absence of the black-and-red ware from the chalcolithic level and the presence of the ware at the neolithic and megalithic levels pose a problem which requires intensive investigation by the students of archaeology, particularly by those belonging to that region.

Since the chalcolithic black-and-red ware of Maharashtra (Tekwada, District Jalgaon), which is a neighbouring State of Karnataka, is identical in many respects with its neolithic counterpart of Karnataka, there is every possibility of its availability in the chalcolithic context in Karnataka too. Next, the cause of the contemporaneity of the chalcolithic periods of Bihar and Karnataka also deserves investigation, though it seems to me mere accidental.

The earliest chalcolithic stratum in Bihar has been dated be C^{14} to about 1600 B. C. and that in north Karnataka may also be assigned to the same period. The chalcolithic level in south Karnataka (Brahmagiri and Maski) has been dated between early first millennium B.C. to circa 400 B.C.

16. EXCAVATION OF ANCIENT ZINC SMELTING FURNACES AT ZAWAR, RAJASTAN

K. T. M. Hegde

INTRODUCTION

A series of impressive nearly intact structural remains of furnaces used in the production of metallic zinc in antiquity was brought to light in an excavation at Zawar in December, 1983. Zawar, 24° 21′ N. 73° 41′ E., is situated in the Aravalli Range, 48 km south of Udaipur in Rajasthan (fig. I.)

Zinc is a soft, white, light, volatile metal. Under one atmosphere pressure it boils at 908° C. Though the initiation of reduction of zinc oxide to zinc by carbon begins at 950°C, the minimum necessary temperature for successful extraction of zinc from zinc oxide in a retort made up of a refractory material is 1250°C. ($ZnO + C \; Zn + Co$- 57000 cal.) It is a highly endothermic reaction. Therefore, before the advent of modern high pressure technology, zinc had to be, inevitably, produced as a vapour. In an ordinary smelting furnace this vapour would promptly reoxidize to light zinc oxide and be carried up the flue. To overcome this problem zinc oxide has to be smelted with an excess of charcoal powder or any other suitable carbonaceous matter, in a distillation system composed of a retort, placed within a special furnace, capable of reaching and maintaining the necessary high temperature of 1250° C. The retort has to be connected to a condenser placed outside the furnace chamber, where zinc vapour would cool down into a liquid and then solidify. The process of distillation and condensation of zinc vapour has to be carried out in a reducing atmosphere, charged with an excess of carbon monoxide, to avoid reoxidation of zinc vapour into 'philosopher's wool' – *pompholyx,* that is, light smokey and white zinc oxide. Archaeological explorations and excavations at Zawar have revealed sufficient evidence to enable us to reconstruct the technology that was used in the production of zinc in ancient India.

Brass alloy

Before going into a description of Zawar industry, it is perhaps pertinent to point out why was zinc produced in the past. Zinc was and still is extensively used in the production of brass, an alloy of copper and zinc. Zinc in vapour form easily mixes with copper. Fusion of zinc into copper increases the strength, hardness and toughness of the latter. When the alloy is composed of more than 10 percent of zinc it has the pleasing golden yellow colour. It can also take very high polish and hence literally glitter like gold. On account of this attractive golden glitter, brass has been a popular alloy in India and abroad for over 2000 years. It was specially used for casting statutory and fabricating a variety of useful vessels for serving food, drink, cooking and storing. Brass sheets were used for covering temple roofs. The alloy was also used for making a certain class of furniture. As children many in India will have slept in brass cradles. The author of this paper did.

The early history of brass is rather obscure. Whatever little evidence available on the subject is ably summarized by Craddock (1978, pp. 1-16). At present the origins of the alloy are not known with any certainty. There is literary evidence to show that brass was known as *oreichalkos* in Greece and Anatolia in the mid-centuries of the first millennium B. C. In the Indian sub-continent the earliest brass objects were found in the levels dated to the fourth century B. C. in an excavation at Taxila. Taxila(Taksha shila) now in Pakistan, had a long history as an important trading-centre of the past.

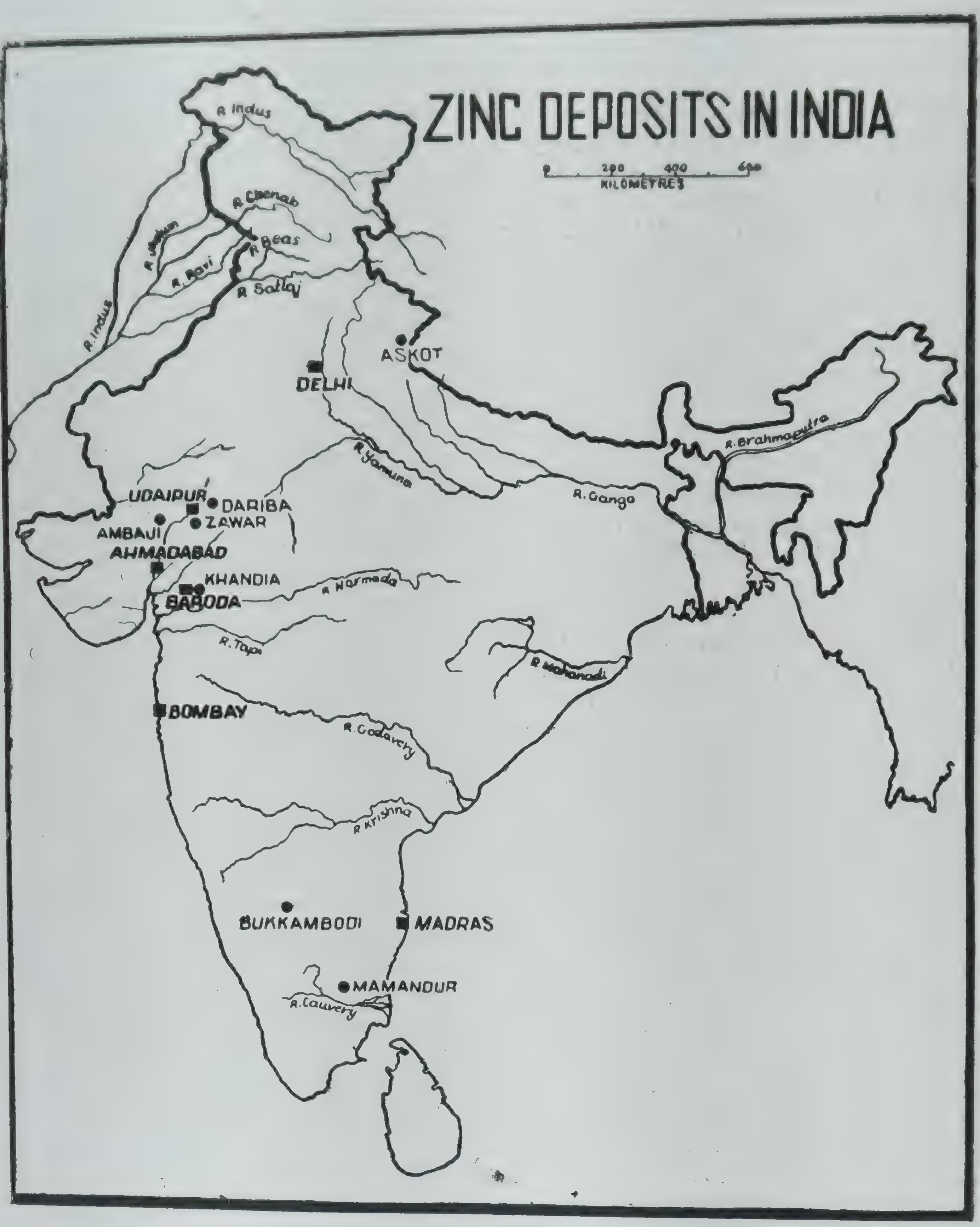

ZINC DEPOSITS IN INDIA
0 200 400 600
KILOMETRES
R. Indus
R. Chenab
R. Jhelum
R. Beas
R. Ravi
R. Satlaj
R. Indus
ASKOT
DELHI
R. Yamuna
R. Brahmaputra
R. Ganga
UDAIPUR
DARIBA
AMBAJI
ZAWAR
AHMADABAD
KHANDIA
BARODA
R. Narmada
R. Tapi
R. Mahanadi
BOMBAY
R. Godavery
R. Krishna
BUKKAMBODI
MADRAS
MAMANDUR
R. Cauvery

Fig. 1

Brass objects in the excavations there continued to occur until the fifth century A.D. (Marshall, 1951; pp. 564-606).

Cementation process

Brass can be produced in two ways. One of them is direct fusion of copper and zinc. In this process it is possible to control the percentage of each component in the alloy. Brasses containing up to 36 percent zinc are known as α brasses. These undergo easy cold work. Brasses containing more than 36 percent zinc are known as $\alpha + \beta$ brasses. These are lighter and harder and more suitable for casting statutory. Brasses containing more than 46 percent zinc are brittle.

The other process of manufacturing brass is the cementation process. It is no longer in vogue. In this process, finely divided copper fragments were intimately mixed with zinc oxide and charcoal powder and heated at 1000° C in a sealed crucible. At this temperature a certain amount of zinc vapour was formed which dissolved into fragments of copper yielding a poor quality brass alloy full of many inclusions. In this process it was not possible to control the percentage of zinc in the alloy. Werner (1970; pp. 259-69) and Haedecke (1973; pp. 229-33) have experimentally demonstrated that the brass produced by this process could not contain more than 28 percent zinc. The temperature of 1000° C was crucial to this process. Below 950° C no zinc was produced. If the temperature was higher, at 1083° C copper melted and flowed down to the bottom of the crucible forming a puddle there, exposing very small surface area of the metal for alloy formation. These inadequacies notwithstanding, the cementation process formed the basis of brass industry in Europe from the mid-centuries of the first millennium B. C. to the early part of the nineteenth century (Craddock *et al*, 1980; pp. 53-64).

High zinc brass in ancient India

There is archaeological evidence to believe that high zinc brasses were made in ancient India. A brass vase excavated from the Bhir mound at Taxila, dated to the fourth century BC showed on analysis 34.34 percent of zinc (Marshall, 1951; p. 568). Such a high percentage of zinc in the alloy could have been brought about only by direct fusion of copper with zinc. Here therefore we have evidence to believe that zinc was distilled in ancient India. The Radiocarbon dates for the Zawar zinc smelting industry lend support to this view. Let us therefore turn to the evidence unearthed at Zawar.

Excavations at Zawar

A team of archaeologists from the M. S. University of Baroda, in collaboration with the Hindustan Zinc Limited and the Research Laboratory of the British Museum, carried out an exploration and excavation at Zawar. Zawar has been well known as an ancient Indian mining and metal working site. Travellers including Tod (1950, p. 222) and more recently geologists (Mookherjee. 1964; pp. 657-77) have commented on the deep mine shafts and extensive heaps of debris that had accumulated at the site from the past metallurgical activity there.

A survey of the old mines around Zawar revealed that many of them were worked down to a depth of 120 m or more. Their deep shafts opened into many galleries and narrow tunnels following the natural configuration of sphalerite mineral veins at different levels. All the galleries were provided with one-and-a-half to two metre diameter holes for ventilation at regular intervals. Radiocarbon assay of the timber supports found at a depth of 100 m has given two dates for the zinc metal industry at Zawar. They are: 2120 ± 60 and 1920 ± 50 years before the present (Craddock, Gurjar, Hegde, 1983, p. 216). As these rediocarbon samples come from a depth of 100 m it is possible to observe that the zinc metal working at Zawar might have started at least a few centuries earlier. More radiocarbon samples

A CROSS SECTION OF THE ZINC DISTILLATION FURNACE FOUND AT ZAWAR

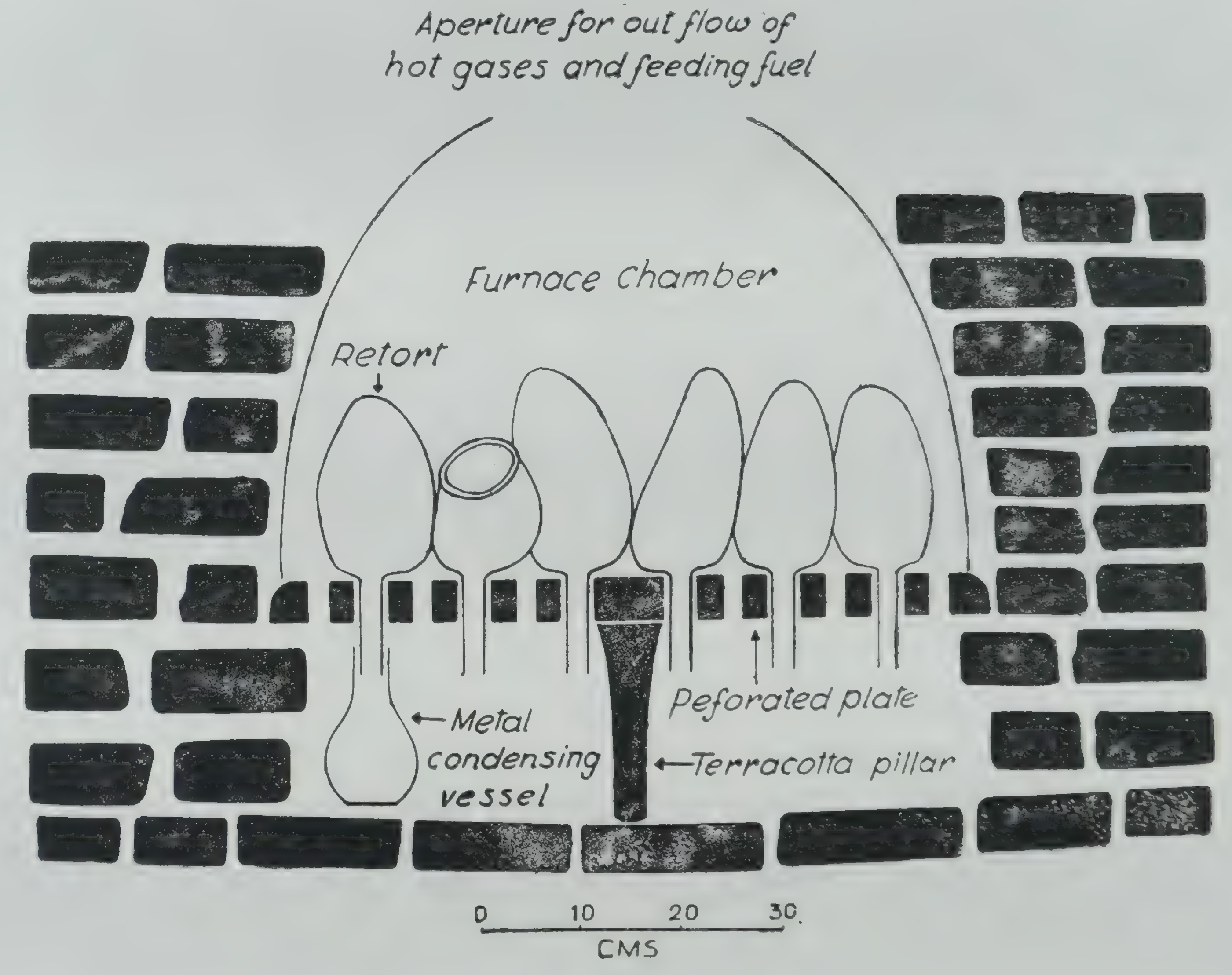


Fig. 11

are now being analysed at the Research Laboratory of the British museum.

Scale of Zinc Production At Zawar

The massive heaps of debris formed by the past zinc smelting operations at Zawar are impressive (pl. I). They are built up of broken spent zinc distillation retorts, furnace fragments and ash. A rough estimate of the debris at the site suggests that they could be of the order of a million tons. It appears that a substantial quantity of zinc was distilled at Zawar over the centuries.

Zinc Distillation Furnace

The excavations at Zawar brought to light a series of impressive, nearly intact structural remains of furnaces (pl. II) that were used in the distillation of zinc in antiquity. These structures enable us to reconstruct how zinc was made in the past.

The furnaces are in two parts (pl. III and fig. II) consisting of a zinc vapour condensation chamber at the bottom and a furnace chamber at the top. The two chambers are separated by a perforated terracotta plate. The condensation chamber measures 65cm by 65 cm and 20 cm in height. The perforated terracotta plate(pl. IV) that separates the two chambers is a composite unit made up of four equal segments of 35 cm^2. It is four cm thick, well-baked and sturdy. Its perforations include circular holes of two sizes : larger ones of four cm diameter, each of which is surrounded by a number of smaller holes of 2.5 cm diameter. Within the furnace the composite terracotta plate was found to be supported on a ledge in the furnace walls on all four sides and a single solid terracotta pillar placed below the junction of its four segments (fig II and pl. IV).

Up above the perforated terracotta plate is the furnace chamber. In it 36 charged retorts were arranged, inverted vertically, in six rows, six retorts in each row, their condensation furnace tubes passing down into the condensation chamber through the larger holes in the terracotta plate. Thus, the arrangement of the retorts in the furnace at Zawar was strikingly similar to the vertically inverted retort zinc distillation process, *distillation per descensum*, patented by William Champion in Bristol in Britain in the eighteenth century (Tylecote, 1979; p, 132). At Zawar no zinc metal collecting vessels were found in the condensation chamber. But it stands to reason that 36 vessels were placed, one underneath each retort to collect and condense zinc vapour.

The furnace structures unearthed at Zawar did not include their roof part. However, curvature of their extant brick walls (fig. II) suggest that the furnaces probably had domed roofs with a chimney like opening at the top. This opening would have served two purposes : (1) it would have acted as an outlet for the flow of hot gases generated within the furnace, and (2) it would have also facilitated continuous feeding of the furnace with fuel. Delicate nature of the thin walled, small clay retorts suggests that the fuel used was light but efficient. No charocoal chunks or wooden pieces could have been used. Use of charcoal powder would have blocked the flow of induced draught into the furnace. It is therefore possible to observe that only light, thin cow dung cakes could have been used as fuel. Cow dung cake fire can quickly reach a high temperature and also maintain it long enough if there is a constant supply of fuel as well as oxygen. Oxygen flowed into the Zawar furnace through an induced draught.

When the furnace was set fire to, hot gases formed within the furnace rose up and passed out through the top outlet inducing a natural draught of air into the furnace. Fresh air flowed into the furnace through the front opening in the condensation chamber and the smaller holes in the perforated terracotta plate separating the condensation chamber from the furnace chamber. Reduction of zinc oxide by carbon is a strongly endothermic reaction requiring 57 k cal. of heat. This heat has to be supplied to the smelting charge placed within the retorts. The furnace temperature therefore has to be of the order of 1250° C. A continuous supply of fuel and a strong induced draught are necessary to maintain this high temperature. The heat generated in the furnace had to be efficiently transferred into the retorts. Therefore the retorts used at Zawar had to be small, thin walled, made of the locally available, inexpensive refractory material — the Tiri River bank clay.

Retorts

The zinc distillation retorts used at Zawar are all small, cylindrical, 25 to 30 cm long, 10 to 15 cm in diameter, made by hand, of locally available river bank clay. Their one end is tapered and pointed, the other is luted to a cone-shaped clay funnel, whose condensation tubes are often found to be broken (pl. V). Before luting the clay funnel the retorts were filled with the smelting charge. An analysis of the spent charge from the retorts (Freestone *et al*, 1985, pp. 229-41) has broadly suggested the composition of the smelting charge.

Smelting Charge

The analysis of the spent charge revealed no evidence of sulphur in it. This is significant. The zinc ore at Zawar is a sulphide, sphalerite, occurring as veins in an impure dolomite host rock. It now appears that prior to distillation the ore was roasted to convert it to zinc oxide. Roasting of sphalerite ($2\,ZnS + 3O_2 - 2Zn + 2SO_2$) is also partially an endothermic reaction requiring a temperature of the order of 900° C. Soon after the oxidation reaction sets in, sulphur in the ore supports combustion. However, to produce a dead roast, free from sulphur, higher temperature of the order of 1000° C is necessary (Dennis, 1961; p. 187). It is not clear how this roasting was accomplished at Zawar. Light weight of zinc oxide makes this process none too easy. In the process of ore roasting at Zawar, associated dolomite, $Ca\,Mg\,(CO_3)_2$ was disociated into calcium and magnesium oxides. The High MgO and Cao composition of the spent charge is a clear indication that a high proportion of calcined dolomite was included in the smelting charge. Analysis of the spent charge also revealed the presence of potassium, aluminium, manganese, silicon, sodium and chlorine. Among these the first four elements are likely to have been derived from the ore and its associated gangue. However, the presence of over seven percent of soda and traces of chlorine in the spent charge is less easy to explain. It is not likely that they were also derived from the ore. It is more likely that common salt was added to the smelting charge. It may be of interest to note here that in a fourteenth century text : *Rasaratnasamuccava* (Shukla, 1928; pp. 108-10) medieval Indian itarochemists specify common salt as one of the ingredients in the distillation of zinc.

Inclusion of salt in the smelting charge would serve the zinc distillation process in two ways. First, it would help to sinter calcium and magnesium oxides and hence keep the charge within the retorts in a porous open texture. This would minimize the chances of zinc vapour getting trapped in any one part of the retort and forcing that part to burst open. Secondly, soda vapour would react with the silica and alumina of the clay in the interior surface of the retort wall to produce a thin film of glaze. This glaze would prevent the loss of zinc vapour through the micropores in the thin clay wall of the retort. It is perhaps no coincidence that common salt was also included in the smelting charge of the *distillation per* *descensum* process patented by William Champion.

Smelting Fuel

The analysis of the spent charge did not give any clues to identify the fuel that was used for reducing zinc oxide and also producing an excess of carbon monoxide. *Rasaratnasamuccava* however mentions a number of carbonaceous ingredients used in the smelting charge of zinc distillation process. They include turmeric, resin, soot, lac treacle, mustard and ghee. The spent charge In the Zawar retorts resembles a mass of small 1 cm^3 balls loosely fixed together. The organic ingredients above, as well as providing carbon monoxide, the necessary reducing agent, would have also served to stick zinc oxide powder to form pellets. Pellets would create an open texture and also increase the surface area of reduction reaction and facilitate heat transfer. Carbon monoxide was produced in the retort at a high pressure. It preceded the zinc vapour with so much pressure that it displaced the air in the condensation vessel and produced the necessary reducing atmosphere for the condensation of zinc vapour (pl. VI).

Channelizing Zinc Vapour

All spent retorts when freshly cut open show a clear cylindrical channel at the centre through the spent charge (pl. VII). This channel was provided to facilitate the free flow of zinc vapour through the luted funnel condenser tube, down into the condenser vessel. In appears a cylindrical reed of 1.5 cm diameter was inserted into the retort after it was charged and the funnel part was luted on it. This reed helped to keep the charge within the retort when it was inverted and placed in the furnace. When the furnace was set fire to the reed burnt away leaving behind a cylindrical flow channel for the zinc vapour to freely flow out of the retort.

Temperature of Distillation

The walls of clay retorts are highly vitrified, bloated and distorted. Their examination under scanning electron microscope (Freestone, *et al.* 1985,pp. 229–41) suggests that retorts were heated at a high temperature of the order of 1250° C. Such a high temperature, it appears, was reached and maintained for several hours in the Zawar zinc distillation furnaces.

Conclusion

In conclusion the salient features of the zinc distillation industry at Zawar may be summarized as follows :

1) It appears that the zinc ore mining and smelting industry at Zawar began in the mid-centuries of the first millennium B.C. Both the mining and smelting operations were laborious and labour intensive operations.

2) Sphalerite with impure dolomite was mined, crushed, concentrated and roasted to convert the starting materials to oxides.

3) The smelting charge was rolled into pellets of 1 cm ^{3}. It included about seven percent of common salt and a calculated quantity of carbonaceous matter.

4) The charge was loaded into small, thin walled clay retorts and funnel like condenser tubes were luted on them with clay.

5) Cylindrical reeds were inserted into the charged retorts through the funnel tubes to keep the charge within the retorts when they were inverted and placed vertically upright in the furnace. In the heat of the furnace, the reeds burnt way yielding clear flow channels for the zinc vapour to flow out of retorts.

6) The retorts were heated externally at about 1250° C in specially designed furnaces.

Zinc vapour was collected and cooled under carbon monoxide in condenser vessels placed in the condesation chamber of the furnace.

7) It is likely the three to four hundred grams of zinc powder were extracted per retort.

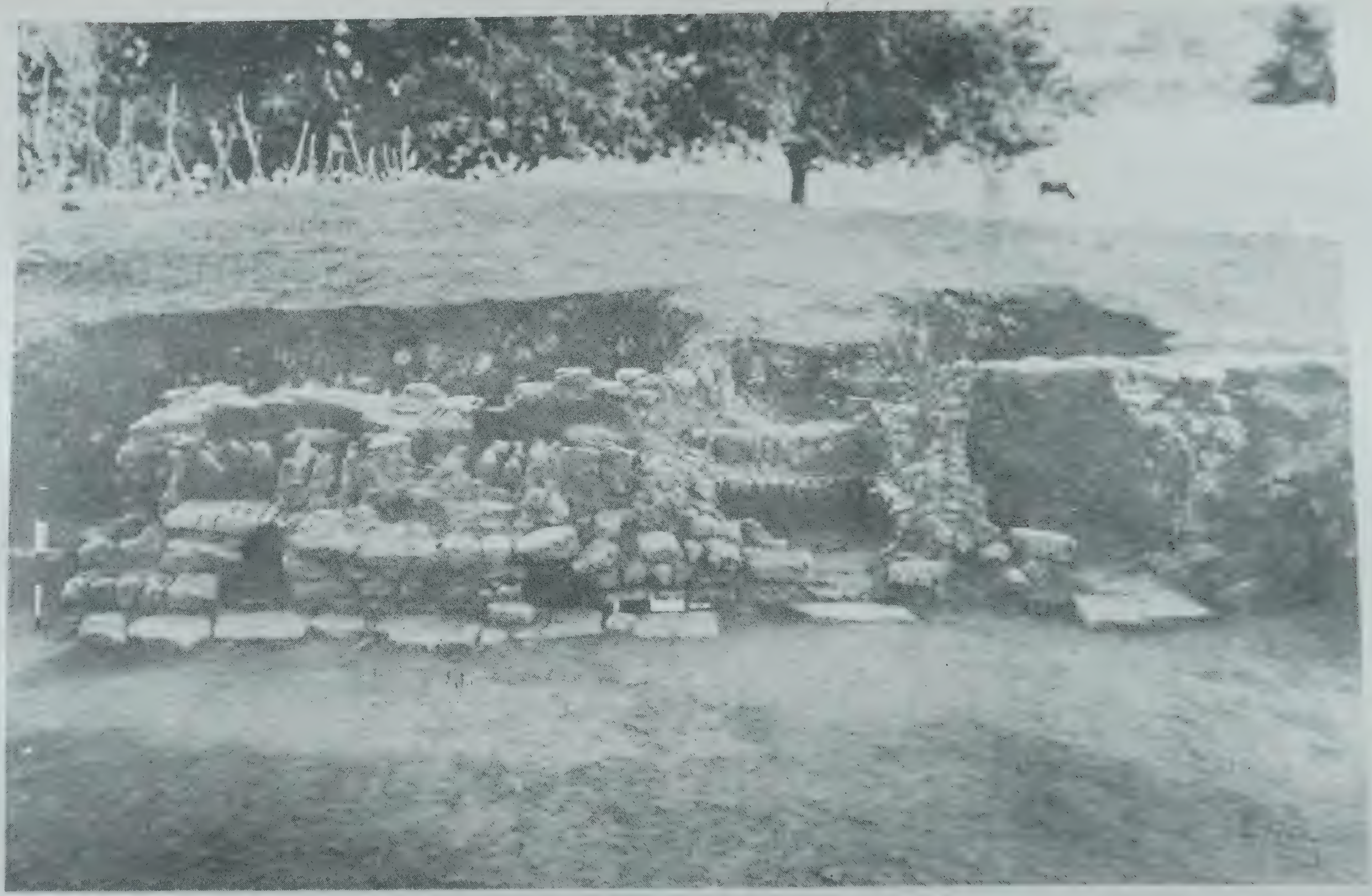
8) It is interesting to note that Zawar was the first site to yield zinc distillation furnaces and retorts. No where else in the world such structural evidence of zinc distillation in the past has been so far reported.

9) It is obvious that certain critical conditions were carefully observed and maintained in the zinc distillation process. For example: (i) the ratio of the carbonaceous matter to zinc oxide in the smelting charge was such that the pressure of carbon monoxide produced in the retort was just about sufficient to reduce zinc oxide, displace air from the condensation vessel and provide the necessary reducing atomosphere within the vessel when the zinc vapour condensed in it. However, if the quantum of the carbonaceous matter was much more, the yield of zinc per retort would be proportionately less. If on the other hand if it was less the pressure of carbon monoxide produced would not be adequate enough to produce the necessary reducing atmosphere for the condensation of zinc vapour. In other words the ratio of zinc oxide to reducing fuel in the smelting charge was calculated and was strictly under control. (ii) Similarly, the sphalerite ore at zawar occurs mixed with galena, that is lead sulphide. But the percentage of lead in the spent charge found in the retorts is less than two. This shows that much care was taken to beneficiate the zinc ore by separating zinc and lead bearing minerals. An excess of lead in the zinc smelting charge would have had a fluxing effect causing extensive melting at high temperature and this would have inhibited the reaction. Benefication at Zawar was done by hand picking sphalerite. But this laborious process was very ably done, (iii) The necessary temperature for smelting zinc oxide is 1100° Celsius. To impart this temprature inside clay retorts, the furnace temperature has to be of the order of 1250° C. If however this temperature of the furnace goes up a little higher, there is the danger of clay retorts deforming and collapsing. If the temperature of the furnace was lower the reduction reaction inside the retorts would not set in. This shows a high degree of skill in controlling the furnace temprature. (iv) Further, to maintain the requisite high temperature within the furnace, a continuous supply of fuel and a simultaneously induced adequate draught through the furnace were necessary. To fulfil these conditions efficiently, the dimensions of the opening at the top of the furnace and the opening at the bottom of the furnace structure, infront the condensation chamber, the size and number of smaller holes in the terracotta plate separating the condensation chamber from the furnace chamber and the rate of feeding of the fuel into the furnace chamber must all be strictly interrelated and skilfully controlled.

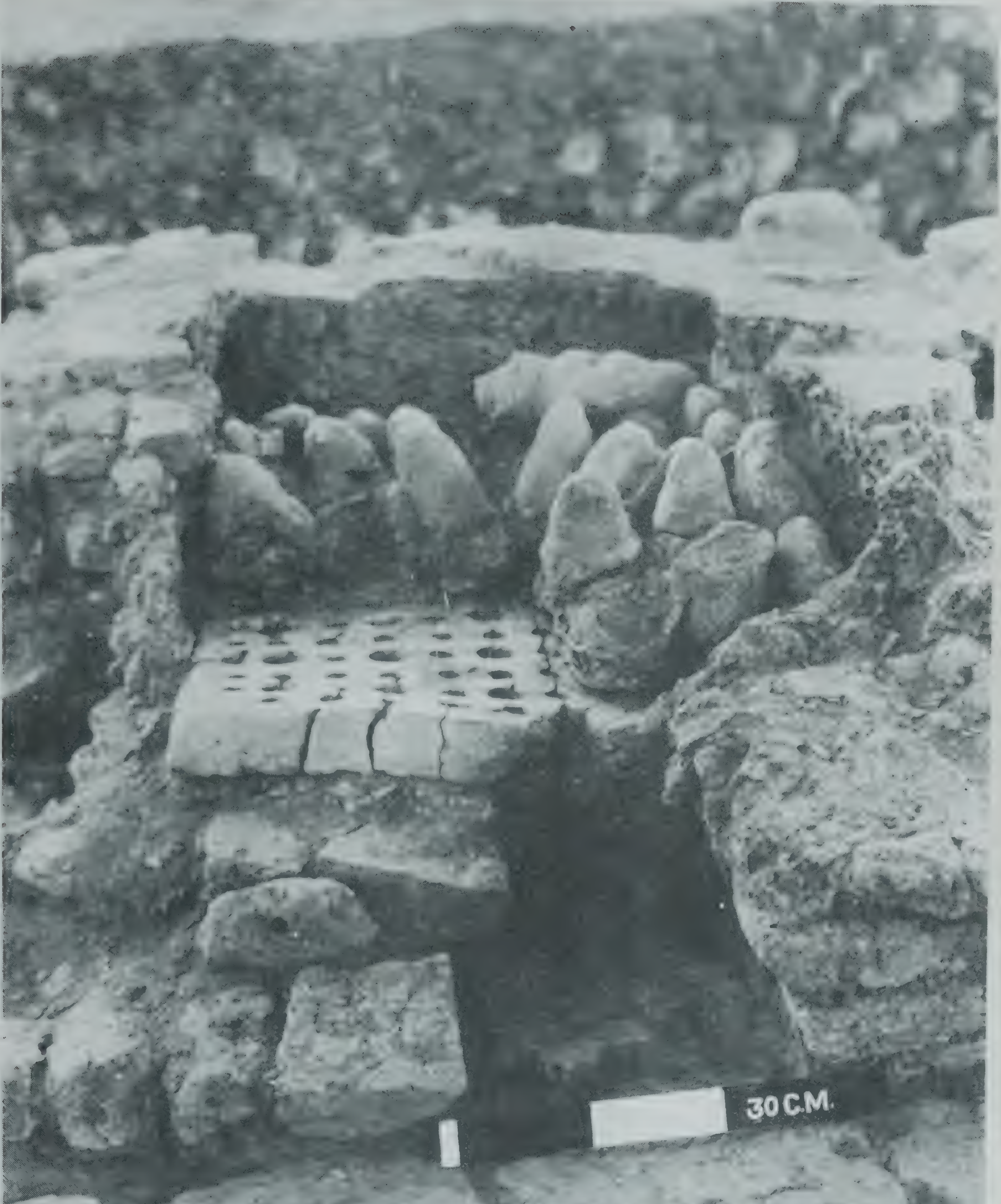
Summing up, we may observe that the zinc distillation process at Zawar was sophisticated.

10) Continuous production of zinc at Zawar and likely many other sites in the Aravalli Hills rendered brass an inexpensive popular alloy in India. Even to-day the Indian village folk are justly proud of their rows of golden glittering brass vessels in their homes.

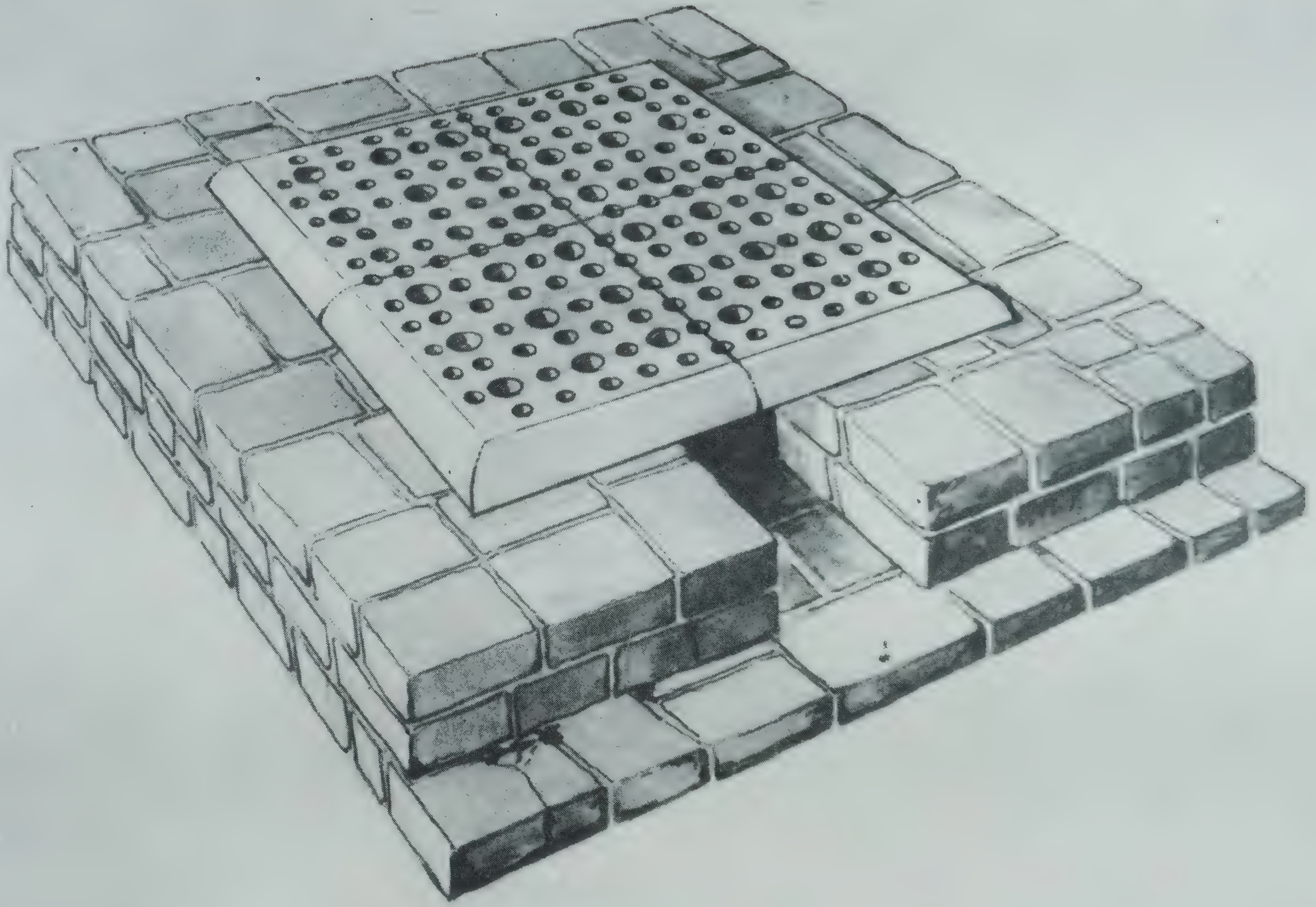
Pl. I Massive heaps of debris formed by past zinc smelting operations at Zawar



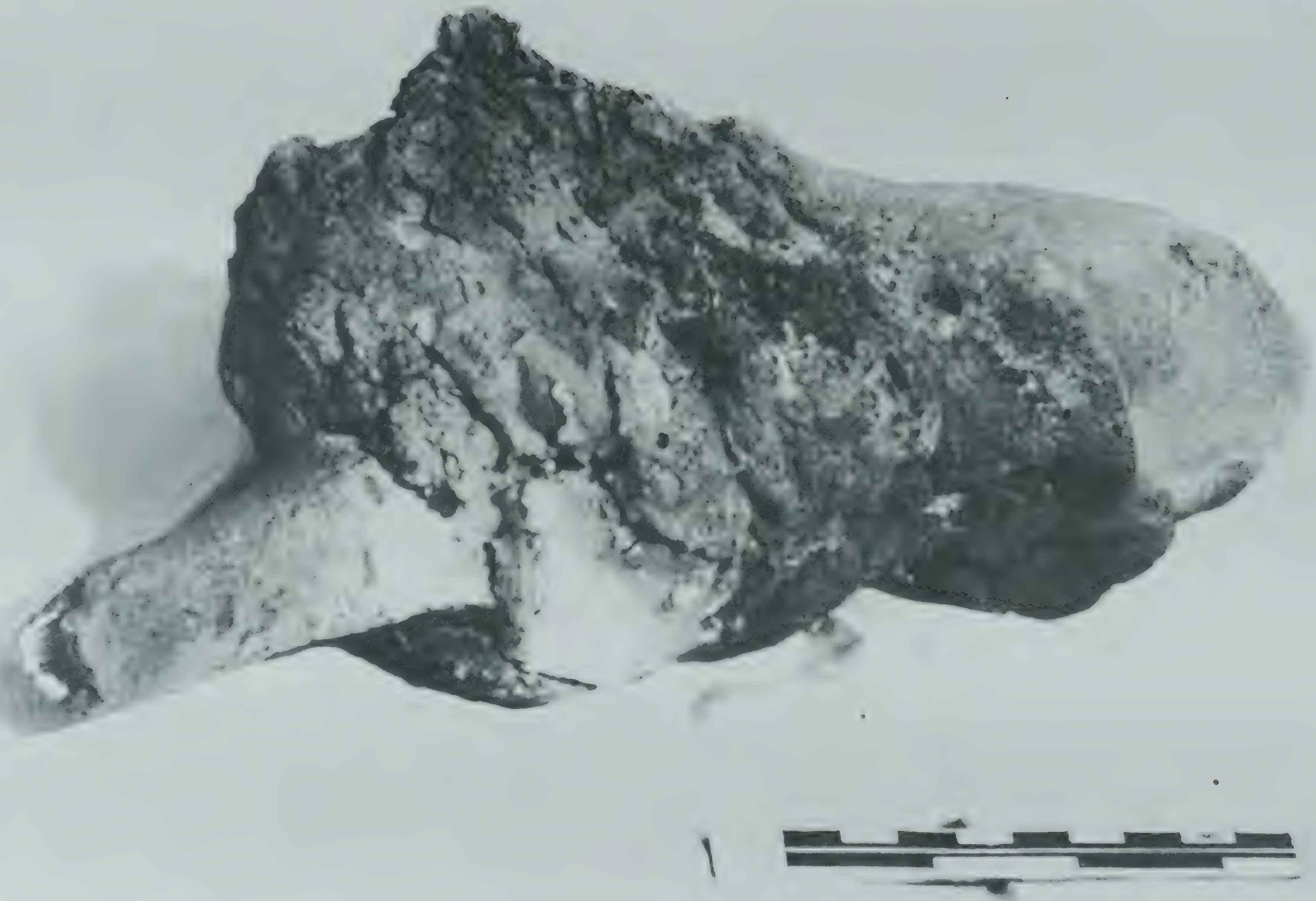
Pl. II A series of impressive, nearly intact structural remains of zinc distillation furnaces brought to light in the excavations at Zawar



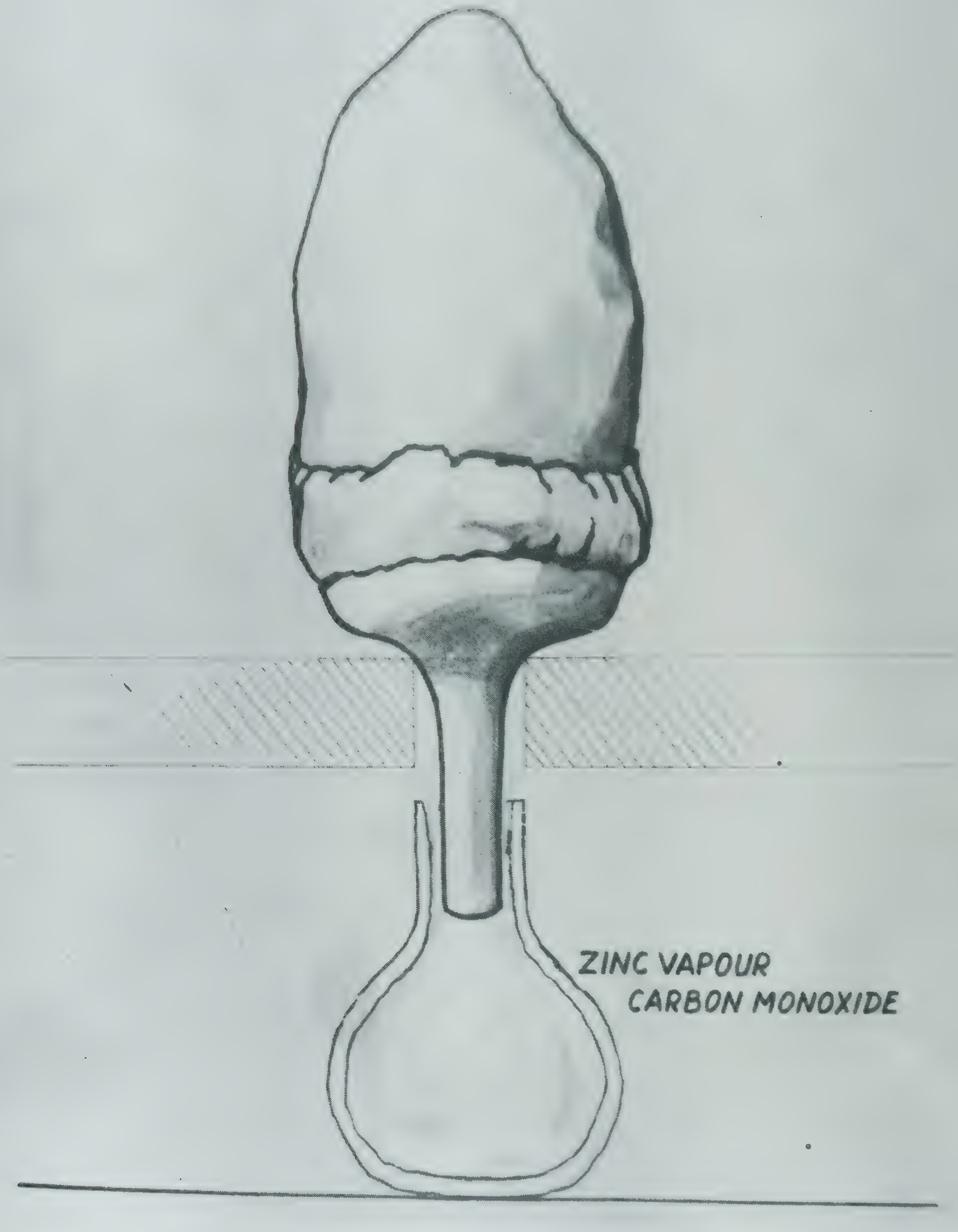
Pl. III Structural details of an ancient zinc distillation furnace excavated at Zawar. Below the perforated terracotta plate is the zinc vapour condensation chamber. Above the plate is the furnace chamber. Some of the zinc distillation retorts are seen in situ



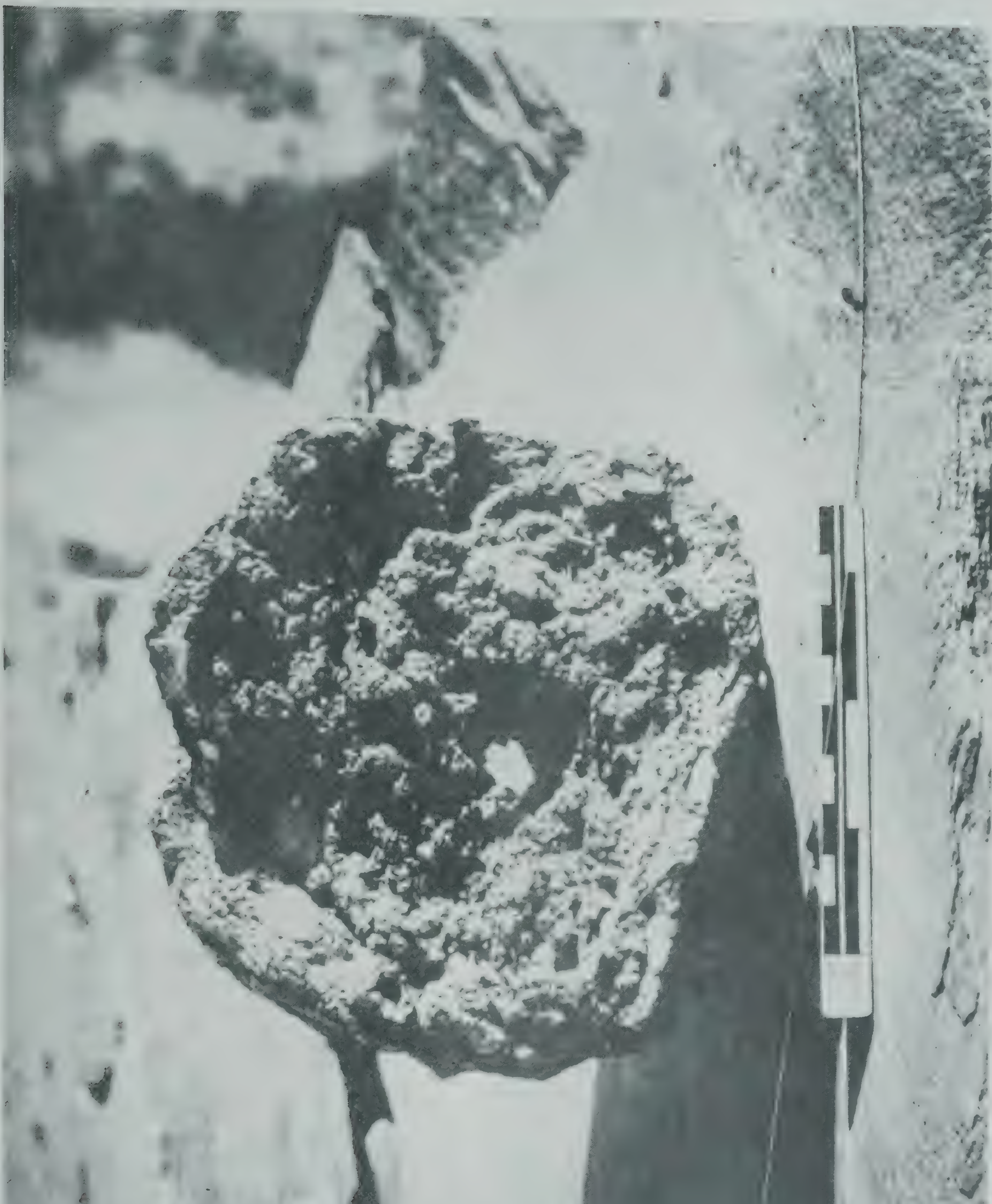
Pl. IV Perforated terracotta plate that separates the condensation chamber from the furnace chamber



Pl. V One of the used zinc smelting retorts found in the excavation at Zawar



Pl. VI Zinc Vapour Distillation and Condensation



Pl. VII A freshly cut open used retort at Zawar showing the clear Cylindrical channel through the sintered spent smelting charge for the zinc vapour to freely flow out of the retort

17. NEW LIGHT ON THE MEGALITHIC EXCAVATIONS AT HEGGADEHALLI AND KOPPA

K. K. Subbayya

The site in Koppa

The megalithic site in Koppa is one of the largest in South India. The site is so extensive that it is almost impossible to enumerate the megalithic burials in several thousands in it. The site of Koppa is situated on the right bank of the river Kaveri and extends to a distance of about 8 kms. to the north and 6 kms. to the west. Every type of the known megalithic monument is in this complex. They include dolmens, cists, twin chambered cists, passage graves, cairns, stone circles, menhirs, etc.

Koppa is located in Periyapatna Taluk of Mysore District, about 88 kms from Mysore and about a km. interior to the left of the Mysore-Madikeri (Mercara) highway. The present Koppa is a small village with a population of about 2000.

It was at Koppa that one of the earliest diggings in India out of curiosity was carried out by Capt. Cole (1868-69; pp. 151-55 & 243-45). The excavation then could not be scientific as the techniques and methods necessarily used now, were then not known and even the nature of these monuments were wholly unknown. Capt. Cole was, at least, able to understand that they were sepulchral in function.

About a decade ago the site of Koppa was excavated by the Department of Ancient History and Archaeology, University of Mysore, under the direction of the author. The excavation was conducted for three seasons that is 1975-76, 1976-77 and 1983-84. In all, 29 tombs were exposed of which were 15 stone-circles, 11 cists, 2 twin-chambered cists and a cairn.

The site in Heggadehalli

The megalithic site of Heggadehalli is also an important site, situated about 3 kms to the North-East of Kudige in Somwarpet Taluk, District Kodagu (Coorg). The river Harangi, a tributary of the Kaveri flows about 2 kms. from the site. The megalithic tombs extend from Kushalnagar in the South upto the foot of the Jenukallubetta (Rocky hill with bee-hives) in the North. The Heggadehalli megalithic complex consists of stone circles, dolmens, cists, cairns and a solitary menhir. But the stone-circles are the most predominant and visible all round the area. Here the excavation was conducted at the foot-hill of Jenukallubetta which is a granitic outcrop rising about 250 metres from the surrounding plain. Capt. Cole dug three stone-circles in 1868-69. The author also conducted a systematic excavation of four tombs in 1971.

The Department of Ancient History & Archaeology, University of Mysore, conducted the excavation during 1974-75 wherein 3 stone-circles, 2 cists and a cairn were exposed. On the basis of the data available from the excavations a serious attempt has been made in this paper to unravel some of the factors of the megalithic culture which have eluded the scholars so far.

Observation at these two megalithic sites makes it amply clear that the perennial water source in the proximity of the settlement was the most predominant factor. There is a deep valley nearby the graves with perennial water source both at Heggahalli and Koppa. A sensible idea of these people was that graves were always situated on the wasteland, that is elevated place, unsuitable for cultivation.

Some of the most significant discoveries were made in these sites. One such discovery is the undisputable evidence for the cultivation of paddy which has been the staple food in this part of the country for generations. In one of the graves an almost intact paddy grain was discovered adhered to an iron axe. This also indicates that paddy used for funeral rituals seems to have had some ritualistic significance. Capt. Cole, during his digging of the graves here was able to identify Ragi grains, inside the tombs in abundance. Ragi has high antiquity in this part of the country as a staple and nutritious food. Therefore, it appears that the megalithic folk grew these two important crops.

The orientation of the graves is not uniform. The placement of the grave goods do not have any uniformity. The construction and the dimensions of the tombs varied. The portholes in the tombs do not have any definite and specific direction. They may be present in any of the Orthostats: East, West, South and North. The only uniformity that is discernible in the tombs is the technique of laying the Orthostats clock-wise or contra clock wise. But this does not seem to be religious any way, but scientific in character. It is intended to prevent the orthostats from inward collapse.

The skeletons were placed north-south and east-west in extended burials. And in some tombs bones are heaped up. The grave goods, especially the pottery placed with the dead, are of varied types and found at the western end of the tomb, eastern end, southern and northern ends also. In some cases pots were placed all over the area.

The types of iron implements are: swords knives, chisels, tongs, javelins, etc. In each grave different kinds of implements and weapons are placed in a haphazard manner.

It is widely believed that the dimensions of the tombs have something to do with the status of the dead. The excavated data at Koppa and Heggadehalli does not seem to support such belief. In large and well constructed tombs the grave goods are of inferior quality and their number is also less. This seems to be against any sense of logic. On the other hand the most insignificant tombs, small in dimension, unimpressive have yielded most significant materials. For example a small cist attached to a large one has yielded carnelian beads of different size and shape which was probably strung into a necklace. This is the only tomb in the complex which yielded carnelian beads. What is more puzzling is that skeletal remains were completely absent in it. In a large cist where one usually expects to be richly rewarded, was found to contain only two pots of average size. It contained no iron implements. In another cist which is not in any way imposing 29 pots were placed.

In the two twin-chambered at Koppa, the eastern Orthostat of one tomb contained portholes each against the chamber half. But the Orthostat of the other twin-chambered grave did not contain porthole at all. In one of the chambers, there were two skeletons and in the other, no skeletal remains were discovered.

S'rangely enouch no trace of iron was found in any of the four graves in Heggadehalli. It is very common that iron implements and weapons in varying number generally are found in the megalithic tombs elsewhere. How is it then that in this particular group no iron was found ? Can we postulate that they are pre-ironage tombs ? Or can we say that building of tombs with huge stones was practised before the introduction of iron ? Megaliths were erected long before the discovery of iron in Europe. It is quite possible that there were people who practised this style of disposing of the dead before the use of iron. Let me leave it to the scholars here to discuss and come to a conclusion about this.

From the Koppa megalithic complex one thing is certain. The three-legged jars of red ware are found only in the cists and not in the other types of burials. The reason for this distinct variation is not easy to explain. The three-legged jar is generally considered funerary. If that is the case this pcttery should find a place in every grave. But that is not so.

It is said by some scholars that different types of megalithic tombs indicate the social and economic status of the persons entombed. If this is so all the tombs of the same type should contain the identical grave goods. The grave goods vary from tomb to tomb of the same type. The number of goods placed also varies. Under this circumstance it is not prudent to conclude that the typology of tombs indicate the social and economic status of persons. In a grave a tiny pot was found inserted into mouth of the dead unique in nature. A fine neolithic axe was found placed vertically above the bottom slab beside the skeleton. In the other grave the pots were piled one above the other of which one was a huge beaked pan.

18. MEGALITHIC KARNATAKA – A LOCATIONAL ANALYSIS

Ravi Moorti

INTRODUCTION

Although the study of locational aspects of prehistoric people, was introduced in archaeological studies in the West as early as 1930's, such studies in our country hardly made any headway. Significant contributions have been made in this direction, to mention a few such as Suraj Bhan (1977), Dhavalikar (1984; pp. 59-80; 1985; pp. 381–389), Lal (1984) and Shinde (1984).

Although a vast amount of literature has been produced on the Megalithic culture, either it tends to be a typo-technological study or a descriptive site study. Though the present study, has serious limitations on its part since the analysis is entirely based on the information available in published data, it nonetheless, ventures to understand the basic premises of locational analysis with regard to Megalithic sites and problems and prospects involved in it. In fact, the present paper is an attempt to understand the location of Megalithic sites in Karnataka in relation to different ecofacts which governed the selection of sites.

What is Locational pattern ?

The study of locational pattern is one of the most interesting branches of enquiry in the field of settlement archaeology. It is mainly a study of physical location and distribution of human activities and occupations covering different activities within a single room to the arrangement of sites in a region. As it is concerned with locational information, locational pattern studies use features and sites as their data bases. In other words, the locational patterning of archaeological features that represented ancient residences,cemeteries and ceremonial places could be analysed in order to reconstruct the past decisions regarding the use of the environment, allocation of resources, social relationships and the like. The term "locational pattern" has been used here in a very broad sense which means, the physical location of the sites across the landscape and it tries to explore the relationship of living arrangements to geographical features such as topography, soils, vegetation types etc. Since it essentially forms a part of the settlement system, I do not intend to make a micro-level analysis of the sites. as normally the term 'locational analysis' is understood but wood like to consider it at macroscale that too in relation with ecological zones. To quote Willey (1956), "Settlements are a more direct reflection of social and economic activities than are most other aspects of material culture available to archaeologists and this kind of study does not constitute a separate approach to archaeology but is, ... only a necessary part of archaeology...." As he rightly insisted such studies should not be treated as a closed and self-contained system or method but as a part of the total archaeological operation.

The distribution, predictability and competitive variables (such as resource type, spatial variability, temporal variability, biotic competition, disease and cultural and socioeconomic factors) that control resource opportunities and limitations require complex decisions that allow for multiple alternative choices (Butzer, 1982; pp. 245-58). Accordingly, he feels, that the "Site location is essentially rational, often less than optimal, and always to some degree idiosyncratic" (Butzer, 1982; p. 258).

The intrinsic difficulty in predicting site location is that subsistence strategies not only are predicated on resource spaces and technology but also include multiple options in terms of scheduling and demographic aggregation. The primary goals of procurement scheduling are to provide a satisfactory supply of food and raw materials while maintaining a reasonable balance between search and pursuit costs and harvest costs, on one hand, and resource yields, on the other (input-output ratios) (Winterhalder, 1981). Secondary goals of the resource-use schedule include dietary preferences and diversity, prestige functions of foods and their related procurement activities and sex-role differentiation (Jochim, 1976). Demographic aggregation is interrelated by virtue of dependence of population grouping on resource distribution, density and predictability, on the one hand (Jochim, 1976), and the maintenance of cooperative social ties and reproductive viability, on the other (Wobst, 1974). As a result of this functional interdependence, actual site location probably will represent a satisfier rather than optimal adjustment to environmental parameters (Wolpert, 1964).

In other words, as Butzer (1982 ; p. 259) observes, "subsistence and socio-cultural requisites dictate flexible spatial and temporal responses rather than static two dimensional human settlement strategies. Consequently, a probabalistic rather than deterministic approach to site location and patterning is called for."

This methodological approach to the landscape on which human settlements had taken place naturally raises several questions such as, what are the locational parameters of known prehistoric sites in the study area? What are the relationships between such settings and the physiography of the study area ? Which situations are likely to have been deliberately selected by prehistoric groups ? What regional generalization can be made about the likelihood of sites ? What are the factors that influenced the site selection ?

Physiographical Zones of Karnataka

Before we turn to major physiographical zones of Karnataka plateau with their subdivisions, it is advantageous for us to understand the major relief pattern which characterizes the region. The average elevation of the region ranges between 600-900m. The region is highly dissected by numerous rivers mostly rising in the Western Ghats. Physically the region can be divided into (a) Malnad (b) Northern Upland, or Deccan trap, and (c) Southern Upland, the latter two being popularly known as maidan.[1] The surface upto 600m. lies in the northern part where further the 300 m. contour roughly delimits the valley flats (flood plains) which at places are 30 to 40 km. wide and end in sharp break of slope, often cliff-like on uphill side. The basement here is formed by the Peninsular gneiss and Dharwars which are found in the form of high ridges. This pattern is interrupted by the Deccan trap in the Bhima valley.

The 300-600m. height gronp is observed roughly from the middle Tungabhadra around Tungabhadra Dam to the Krishna-Don valley in the north along the border of Maharashtra plateau with some projections of the high patches of Western Ghats. The areal expanse is comparatively greater and the degree of dissection is more.

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1. Note : Here I have adopted the same terminology as used by Singh (1971 : 791-820) in dividing the Karnataka plateau into two major ecological zones with their sub-zones.

The southern upland is relatively higher (600-900m.) and more rugged, and consists a series of rolling plateau culminating into highly irregular and disjointed granitic hills in the Region (over 1,200 m.) to the south of the Cauvery.

Karnataka plateau with its Malnad rim and Maidan character is diversified by the Krishna and Cauvery river systems, rainfall variability resulting in varying patterns of land use and settlements. The physical factors help us in distinguishing three zones viz., i) Malnad (with sub-zones North Malnad, Central Malnad, South Malnad) ii) North Maidan (with sub-zones Bidar Plateau, Gulbarga plain, Raichur plain, Bellary plain, Dharwar Plateau, Bijapur region) and iii) South Maidan (with sub-zones, Chitradurga region, Tumkur region, Bangalore region and Mysore region).

i) **Malnad :** The Malnad stretches in a continuous belt trending NNW–SSE. The width of this region varies from 40–85 km. Often dissected by Western Ghats the topographical features of Malnad vary greatly. North Malnad occupies an area of about 11,000 km. covering about two-thirds of North Kanara and some parts of Belgaum and Shampagaon taluks of Belgaum with some portions of Dharwad district. The region is characterized by high mountains, heavy rainfall and dense forest. Central Malnad comprises the major part of Shimoga district, about western one–third of Dharwad and some parts of Chikmagalur district covering an area of about 17,300 km. The region is forest clad. South Malnad stretches over parts of Chikmagalur, Hassan, Coorg and southern Mysore districts occupying an area of about 13,000 km. In clear accordance with the altitude the Malnad is the the rainiest (over 2,000 mm.) zone, thereby having tropical green and semi-ever green forest cover.

ii) **North Maidan :** It is aptly described as a landscape of monotonous, seemingly endless, plateau covered with rich black cotton soil, of large open treeless fields ' (Singh, 1971; p. 817) of course, excepting its southern portion which is covered with red soil. The Bidar plateau, occupying an area of about 1,863 km., is in the extreme north, covering the Bidar district and some parts of Aland, Gulbarga and Chincholi taluks, the southern parts being more rugged. The Gulbarga plain (11,375 km.) stretches from south of Bidar region to the Krishna. The Bijapur region (18,390 km.) comprises of Bijapur district and some parts of Belgaum. Dharwad plateau (20,770 km.) covers major portion of Dharwad district and eastern part of Raichur. Raichur plain (8,588 km.) covers Raichur district excluding some western part, and forms the central part of Raichur Doab. Bellary plain (11,103 km.) covers almost the whole Bellary district and resembles the Raichur plain. The North Maidan region with its general lower altitude and rain-shadow location is comparatively a dry zone with annual precipitation being belew 700 mm. and consequently has a scrub forest cover.

iii) **South Maidan :** Covering an area of about 57,183 km. this plateau, region is studded with bare granitic boulders and hills and has a somewhat equable climate with a moderate rainfall (900 mm.) consequently having a dry–deciduous forest cover. The Chitradurga region (area 13,973 km.) comprises roughly Chitradurga district, parts of Chikmagalur and Pavagad taluk of Tumkur. Tumkur region (17,478 km.) occupies Tumkur except Pavagad and parts of Hassan and Mandya districts. Bangalore region (17, 314 km.) comprises Bangalore and Kolar districts and a small portion of Mandya. Mysore region (8,416 km.) is one of the smallest regions occupying most of the Mysore district.

LOCATIONAL PECULIARITIES IN EACH ZONE

A cursory glance at the map showing the distribution of Megalithic sites in the Karnataka plateau (Fig. I) is enough to show that there are maximum number of sites in the Maidan region than in the Malnad region. The Malnad region has yielded altogether 8 megalithic sites so far, as compared to 213 sites in North Maidan and 379 sites in South Maidan (See Table II). This distribution is obviously related to the ecology and the reasons are not far to seek. The Malnad region with its high precipitation (2000-4500 mm), thick forest cover, high elevation and also agriculturally poor soil was not conductive to human habitation whereas moderate rainfall (500-900 mm), fertile black soil or alluvial patches and easy accessibility to mineral resources were naturally preferred by the megalithic folks. However, even in the Maidan region we do notice certain peculiarities in its sub-zones. Thus, in North Maidan area the number of sites at the elevation of 900 m. is only 45 as compared to a total number of 168 sites which are situated at an elevation of 600 m. In the case of South Maidan it is just the opposite. Here the number of sites at an elevation of 900 m. is more (366 sites) than those sites which are at an elevation of 300 m. (13 sites).

Another interesting feature which we notice is the proportion of Megalithic sites in each physiographical zone (See Table III). The Malnad region has not yielded any evidence of habitational sites and only 8 burial sites have been reported so far. The North Maidan has a total of 17 habitational sites as against 188 burial sites (Ratio 1 : 11) and in South Maidan there are 61 habitational sites aganist 326 burial sites (Ratio 1 : 5). Before we draw any inference from this statistical analysis I would like to point out here that there are many sites in these zones where material repertoire probably belonging to 'megalithic' period has been noticed. Since it was difficult to consider these sites as habitation sites of megalithic people either because of the lack of contextual evidence or detailed report on the material evidence found at these sites. Hence, I have put them in the category of 'doubtful' megalithic sites. If we take these sites into consideration for our analysis the proportion of habitational sites to burial sites is more or less drastically reduced in each zone, as we see in Table III. In that case the proportion (habitational sites to burial sites) will be 2 : 1 in Malnad, 1 : 3 in both North Maidan and South Maidan. Further probe in this area of research may help us in discarding the view that these people were leading a nomadic pastoral way of life without any permanent settlements as thought earlier (Fergussan, 1872 ; Walhouse, 1874; Leshnik, 1974).

FACTORS GOVERNING THE LOCATION OF SITES IN EACH ZONE

Some of the principal factors whcih probably conditioned the selection of site, have been considered here, they are as under : a) availability of water b) availability of arable land and pastures c) availability of mineral resources d) availability of rock material for the constuction of burial monuments, and e) security.

The avilability of water must have been a primary factor in the selection of sites as a casual glance at the map would show (Fig. I). Though it was not possible for me to map out the exact location of these sites in a majority of the cases due to the lack of requisite information however, Table I shows that most of the sites are situated either on the tributaries of major rivers or on the banks of major rivers themselves. Sites Vibhutihalli, Maski, Piklihal, Brahma–

giri Hallur, T. Narasipura etc., can be cited as examples. In some cases it has been reported that the sites are located nearby a tank (for e. g., at Rakhamgeri, Srinivasapura etc). Though it has been suggested by some scholare (Hunt, 1924; p. 140; Banerjee, 1965; p. 210) that these people were responsible for the construction of tanks and introduction of tank irrigation system, nothing can be siad with certainty in this regard, as suggested by Sundara (1975; p. 217). In any case, it is striking to note that most of the sites, where we can notice pockets of concentration of sites, are situated within a distance of 10-20 km. from major water resources. This can be noticed in the sites situated in the middle reaches of Bhima, upper and lower reaches of Krishna, on Don, in upper reaches of Ghataprabha, in the upper, middle and lower reaches of Tungabhadra, on Palar and Ponnaiyar and also in the middle reaches of Cauvery. Hence the availability of perennial water bodies for people and animal livestock and also availability of large stretches of flat land with alluvium and black soil might have been the reasons for their settlement close to the main river banks.

The second important factor was the availability of arable land for cultivation and also pastures for the maintenance of livestock. The extensive plains of North Maidan are covered with rich black soil and alluvial strips along the river banks in South Maidan provide potential areas for cultivation. The Karnataka plateau has a semi-arid monsoonal climate with the annual rainfall ranging between 400-1000 mm. except in its western most part. The black soil which is known for its fertility and the moisture retention capacity must have been tilled by these people. In this connection it is worth noting that even during the last century it was hoes and not ploughs which were used for cultivating black soil as recorded by Wallace (1888; p. 180)and also supported by Dhavalikar (1984; pp. 68-69; 1985; pp. 386-387) The use of wodden plough for cultivation can not be set aside as suggested dy Dhavalikar elsew here (1974; pp.39-46).The evidence in the form of sickles(which comes from Jewargi, Maski and Brahmagiri), an implement identified as plough-coulter by Dhavalikar (1968; pp. 137-138) (from Brahmagiri) and hoes (from Jadigenahalli) and the occurrence of charred grains of ragi (at Hallur); paddy husk and ragi (from Coorg region) points out in this direction. Even at present in the Maidan region the farmer is completely at the mercy of the monsoons which being erratic, then as now, agriculture must have been a gamble with nature. The occurrence of domesticated animal remains from habitational deposits of Brahmagiri (Nath, 1968 : 65-68), Maski (Nath, 1968a ; p. 9), Piklihal (Allchin, 1960; pp. 114-120) and Hallur (Alur, 1971; pp. 107-123) attains importance in this context, in the sense that, besides agriculture it seems, herding and stockraising was one of the important economic strategies of the megalithic people. Viewed in this background, the location of a majority of sites which are situated at the foothills and their burials in unproductive rocky ground, throws enough light on the nature of their economy.

The high concentration of sites in the eastern part of Bangalore region and northern and southern parts of Raichur plain and northern parts of Bellary plain brings out the third major important factor in the location of these sites. The occurrence of large number of iron objects in their material assemblage proves beyond doubt their heavy reliance on this mineral resource. As the large concentrations of sites are seen (see Fig. I and also Table IV) around Bellary Hospet and Gangawati area (which are rich in iron ores) as well as Hatti and Kolar Gold Fields area (which are known for gold mines), it seems probable that these natural resources might have been exploited by the megalithic people. Though, they might have depended partially on agriculture (which is agriculturally a poor region, at least the Bangalore region) these areas must have been utilized/served mainly for their mining activities/purposes. However, the absence of sites in southern Shimoga region (around Bhadravati) which has also rich iron ore deposits is quite intriguing. At present it seems inexplicable but further investigations in this area may help us to solve this problem.

The Megalithic culture which has been paraphrased as a 'burial culture', has rightly been remarked so because of the dominance of funerary customs in the form of reverence shown in the construction of burial monuments for the departed members of their society. In the stupendous task of constructing such monuments, it did eventually depend upon the availability of suitable stone, where these sites are normally located. This has been amply demonstrated by Sundara (1975) in the case of North Karnataka megaliths. The location of burial sites near hilly areas either in the immediate vicinity or at a reachable distance, wherever suitable rock-material was available in the form of quartzitic sandstone, granite, laterite and Deccan trap did and has played as a deciding role in the locational patterning of their sites. It seems that the location of burial sites was controlled by the availability of raw material whereas this was not the case with the location of habitational sites. The location of Hallur can be cited as an example here. At Hallur, where the habitation site is on the bank of Tungabhadra and the burial sites being 5 km. away at Bhairavanapada and 3 km. west of Hallur respectively where raw material was available for the construction of burial monuments (Nagaraja Rao,1971; p. 137).

Sites like Maski, Piklihal, Koppal, Hirebenkal, Sanganakallu, Chitradurga, Chandravalli, Brahmagiri etc., are surrounded by hills and Banahalli, Hallur, T. Narasipur located on the river banks, exemplify another factor which was of no less importance i.e., security, where they could get some natural protection from predators. As Krishna (1931 ; p.6) has rightly observed in the case of Chandravalli, "The surrounding ranges give the Valley considerable protection from the security point of view while three entrances lead to it." This might have been true in case of other sites too. Such elevated spots besides affording a commanding view of the surrounding areas, also provided natural protection and therefore security may not have been a very difficult problem. But the situation is different when it comes to sites like Hallur and T. Narasipur, the former is situated on the left bank of Tungabhadra and latter at the confluence of the Kabini with Cauvery. Though no evidence concerning the artificial protection at these sites either in the form of defensive moats or fortification wall is reported their location on the bank of rivers might have provided protection at least from two sides.

CONCLUSION

Before we make certain broad generalizations on the basis of above analysis, I would like to say few words about settlement pattern in the Karnataka covering this period. Although over 400 sites of the Megalithic culture have so far come to light, it is difficult to put them into standardised site categories such as city, town, village and so forth. Fruitful attempts have been made by Dhavalikar (1985), Lal (1985) and Shinde (1984) for Chalcolithic and Early Iron Age sites but such classification for Megalithic sites of Karnataka plateau has yet to be done, of course, with precaution because of lack of information available for this period on these lines. Basically, it is difficult in most cases to assess the precise extent of the cultural deposits of a particular period merely on the basis of surface exploration.

Secondly, it is unfortunate to note here that not a single Megalithic settlement has seen a horizontal dig so far, in Karnataka. Without this it is not possible to say anything on their domestic structures let alone on public buildings. However, on the basis of available data (see Table I), though necessarily meagre in nature, we can say that Maski, Piklihal, Chandravalli, Hallur, Brahmagiri and Banahalli seems to have been large settlements as compared to Koppal, Vibhutihalli, T. Narasipura, Rakhamgiri and Tadbidi.

The concentration of sites in certain pockets and their absence or sparse scattering in certain other areas is interesting from the point of view of understanding the man-land relationship in the Megalithic period. I have already indicated the probable decisive factors for the concentration of sites in certain areas. One possibility for the absence of Megalithic sites in northern Bijapur region (here it may be due to contemporaneous existence of Neolithic-Chalcolithic culture) and in northern Gulbarga plain, Bidar plateau of North Maidan and southern Chitradurga region and Tumkur region of South Maidan may be due to poor agricultural land, non-availability of mineral resources and maximum variation in the annual rainfall. However, unless we gather more factual data through intensive micro-level regional studies it is difficult to prove such regional disparities in locational patterning.

In brief, here I have attempted to understand some of the possible environmental factors which governed the settlement pattern during Megalithic period. However, it is only intensive micro-level regional studies if carried in this direction would be able to help us in understanding the cultural ecology of megalithic people.

Table–I

List of Main Megalithic Settlements with their Physiographical Location and Size

S. No.	Site	Physiographic division	River/stream/nala/tank association	Topographical location	Extent of the site
1	2	3	4	5	6
1.	Rakhamgeri	North Maidan ; Gulbarga Plain	Nearby a tank (ancient, modern ?)	At the foot of the hills	About 2 acres (89.44 X 89.44 m.)
2.	Tadbidi	,,	Inf. not available	Situated in the plains between two granite outcrops	About 2 acres (89.44 X 89.44 m.)
3.	Vibhutihalli	,,	Nearby a nala and a tank (ancient/Modern ?)	At the foot of the Shahpur hill range	About 3–4 acres (126.49 X 126.49 m.)
4.	Gorkal	North Maidan ; Raichur Plain	Inf. not available	At the foot of a granite–gneiss hill	Inf. not available
5.	Karadigudda	,,	,,	Near a hillock	,,
6.	Rajalabanda	,,	On the left bank of Tungabhadra	At the foot of a granite–gneiss outcrop	,,
7.	Watgal	,,	Inf. not available	Along the northern and southern sides of a granite hill	,,
8.	Maski	,,	On the bank of Maski nullah, a tributary of Tungabhadra	Surrounded on three sides by gneissic outcrops rising some 400′ above the plains along the foot of the hills	About 50 acres (447.21 X 447.21 m)

1	2	3	4	5	6
9.	Piklihal	,,	Nearby a stream which is a tributary of Tungabhadra	On the Sn. border of a rocky-waste, situated among a cluster of about a dozen granite hillocks	About 50 acres (447·21 X 447.21 m.)
10.	Tawargeri	North Maidan; Raichur plain	Inf. not available	Near isolated knobs and ranges of granite hills	Inf. not available
11.	Koppal	,,	Nearby a stream, a tributary of Tungabhadra	On flat summit of a hill	More than 4 acres (126·49 X 126·49 m.)
12.	Hirebenkal	,,	Inf. not available	In the midst of hill....Site on one of its saddles	Inf. not available
13.	Mallapur	,,	,,	On the top of a steeply high hill, on one of the saddles	,,
14.	Sanganakallu	North Maidan; Bellary plain	Nearby a stream a tributary of Hagari	On the top of a castellated hill, about 100′ high	,,
15.	Hirehal	North Maidan; Dharwad plateau	Inf. not available	In the plain fields of the black cotton soil as well as brownish red soil. Sandstone hills at a varying distances from 1–13 kms.	,,
16.	Unachageri	,,	,,	Site in plain country but not far away (1 km.) from sandstone hills	,,
17.	Gajendragad	,,	,,	Site at the the foot of a long chain of sandstone hills	,,

1	2	3	4	5	6
18.	Hallur	,,	On the left bank of Tungabhadra	Surroundings are characterized by featureless hills	About 33·75 acres (500 X 270 m.)
19.	Kamalapur	,,	Inf. not available	,,	Inf. not available
20.	Chitradurga	South Maidan; Chitradurga region	,,	Near Chitradurga hill	,,
21.	Chandravalli	South Maidan; Chitradurga region	Nearby a stream	Situated immediately to the west of Chitradurga hill	About 40 acres (800 X 200 m.)
22.	Brahmagiri	,,	Nearby Chikhagari nadi	On the Nn. slopes of a range of granite hills	About 20 acres (400 X 200 m.)
23.	Jettinga Rameshvara	,,	,,	Near Chitradurga hill range	Inf. not available
24.	Srinivasapura	South Maidan; B'lore region	To the east of a big tank (ancient/modern ?)	Inf. not available	,,
25.	Doddakadattur	,,	Inf. not available	An open air site with a couple of rock-shelters	,,
26.	Kendatti	,,	,,	At the foot of a granite hill	,,
27.	Tekal	,,	,,	,,	,,
28.	Budikote	,,	Nearby a stream called Markandeyanadi	Nearby an outcrop of granite	,,

1	2	3	4	5	6
29.	Banahalli	,,	In the upper reaches of Palar	At the foot of a castellated granite hill	About 7·5 acres (300 X 100 m.)
30.	Boodititu	South Maidan; Mysore region	On the south bank of Swarnamukhi	Inf. not available	Inf. not available
31.	T. Narasipura	,,	At the junction of the river Kabini with the Cauvery	,,	About 3.75 acres (150 X 100 m.)
32.	Muttalawadi	,,	On the left bank of Cauvery	,,	Inf. not available

Table II

Distribution of Megalithic Habitation Sites & Burial Sites in Varied Altitude

S. No.	Burial types	Malnad	North Maidan		South Maidan	
		150 m. <	600 m.	900 m.	600 m.	900 m.
1.	Pit-Circles	—	95	9	5	113
2.	Barrows	—	9	—	—	—
3.	Chambers	—	9	3	—	132
4.	Port-hole/Passage Chambers	1	3	18	1	43
5.	Urn-burials	4	4	5	—	1
6.	Sarcophagi	—	—	—	—	2
7.	Rock-cut Chambers	3	1	—	—	—
8.	Dolmens	—	14	4	—	7
9.	Menhirs	—	3	1	6	8
10.	Alignments	—	18	—	—	—
	Megalithic habitation sites	—	12	5	1	60
	Total :	8	168	45	13	366
	Doubtful Megalithic habitation sites	9	55			34
	Total :	17	268		413	

TABLE III

Proportion of Megalithic Habitation Sites to Burial Sites

	Malnad		Maidan			
		Ratio	North Maidan	Ratio	South Maidan	Ratio
Total No. of Hab. Sites (excluding doubtful Hab. Sites) with %	0 (—)	0 : 1	17 (8. 2%)	1 : 11	61 (15. 7%)	1 : 5
Total No. of Br. Sites with %	8 (100 %)		188 (91. 7%)		326 (84. 2%)	
Total No. of Hab. Sites (including doubtful Hab. Sites) with %	17 (68 %)	2 : 1	72 (27. 6%)	1 : 3	95 (22. 5%)	1 : 3
Total No. of Br. Sites with %	8 (32 %)		188 (72. 3%)		326 (77. 4%)	

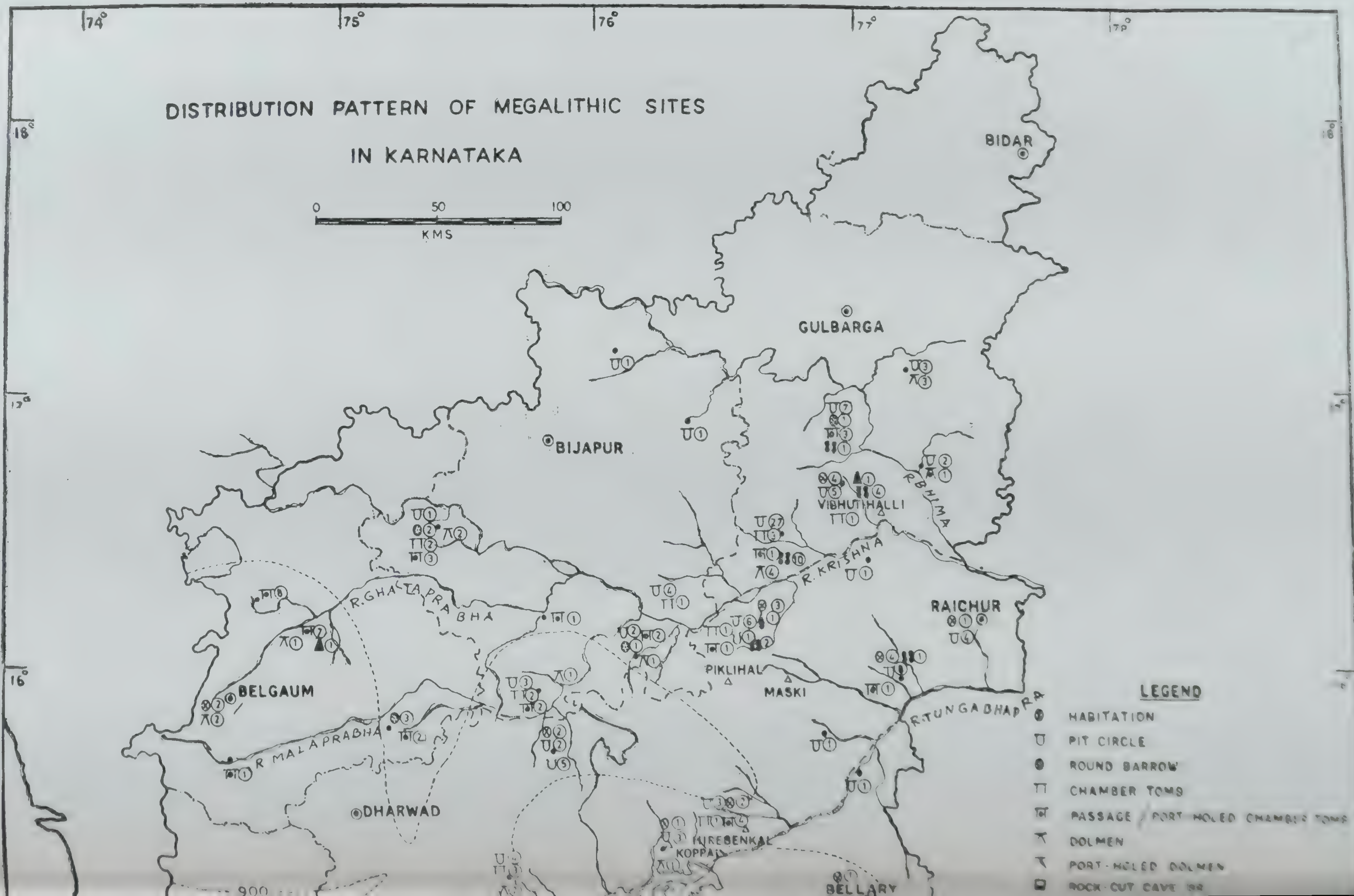
TABELE IV

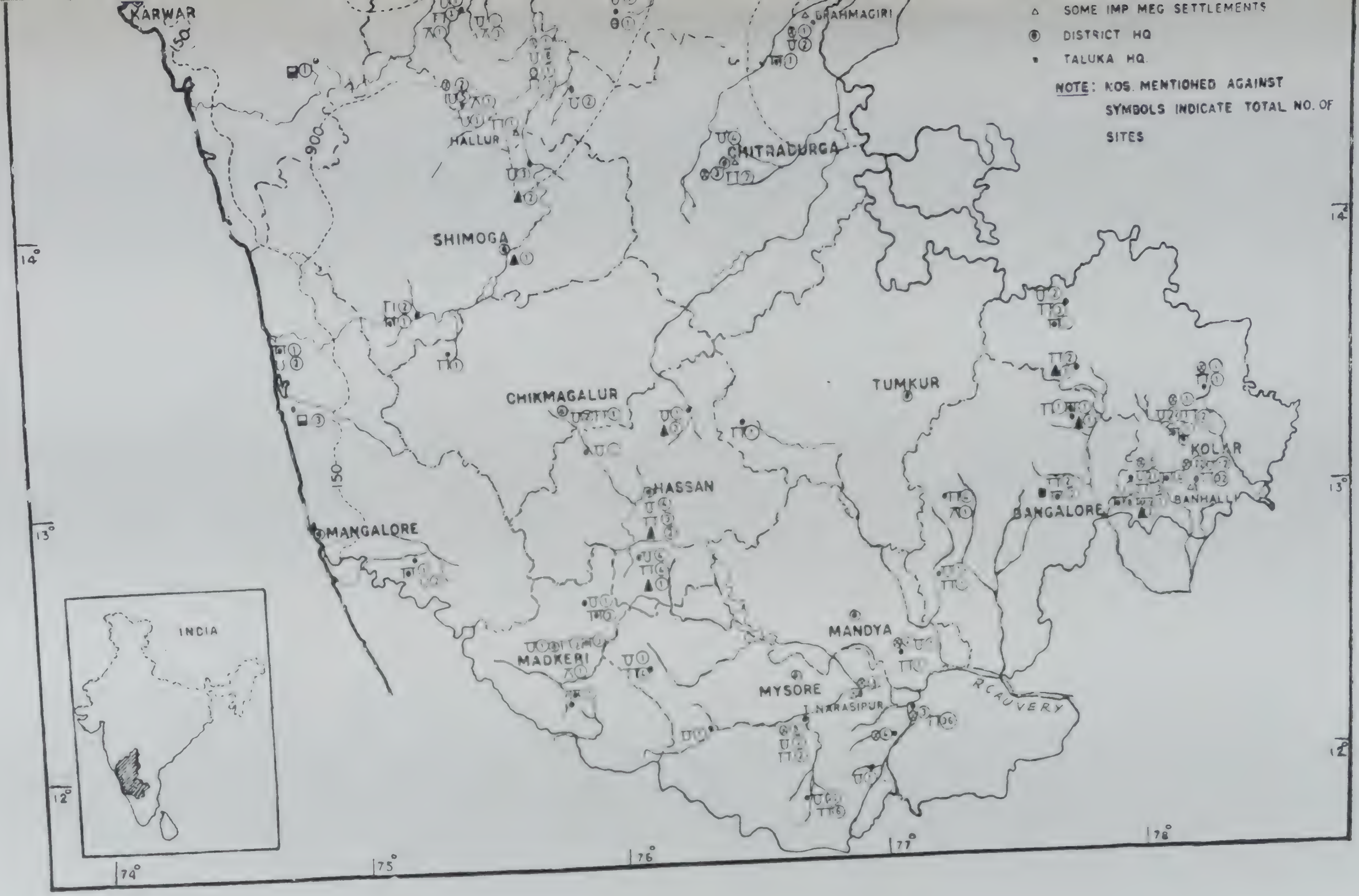
Distribution of Megalithic Sites in Relation to Varied Physical Environment

Physiographic division	Geological formations of the area	Mineral resources	Distances from major water resources	Nature of Soil	Total No. of hab. sites (excluding doubtful hab. sites)	Total No. of hab. sites (including doubtful hab. sites)	Total No. br. sites
1	2	3	4	5	6	7	8
(I) MALNAD							
a) North Malnad							
i) Belgaum region	Decan trap and Karnul-Cuddapahs	Iron	Within a distance of 10–20 kms. from Ghataprabha	Laterite	2	4	
ii) Sirsi region	Granite, Dharwars, & Peninsular-gneiss	,,	Within a dist. of 10 kms. from Varada	,,	—	1	1
b) Central Malnad							
i) Shimoga regoin	Dharwars & peninsular-gneiss	,,	Within a dist. of 10-20 kms. from Tunga	Medium black & Medium red	—	5	3
ii) Sringeri region	Peninsular gneiss and Dharwars	,,	,,	Laterite and Medium red	—	—	2
c) South Malnad i) Chikmagalur region	,,	,,	Within a dist. of 10–15 Kms. from Veda	Medium red	—	—	5
ii) Coorg region	Peninsular gneiss	—	Within a dist of 10–20 kms. from Cauvery	Laterite and Medium red	—	—	11
iii) Gundlupet region	Peninsular gneiss and Charnokites	Iron	Within a dist. of 10–20 kms. from Gundar	Medium red, Mixed red & black	—	1	25

1	2	3	4	5	6	7	8
II) NORTH MAIDAN							
d) Bidar Plateau	Deccan trap & Karnul–Cudda Pahs	—	Within a dist. of 15-20 kms. from Manjra & Kararya	Medium black & laterite	--	1	4
e) Gulbarga Plain	Deccan trap, Karnul–Cuddapah, Dharwars & Peninsular gneiss	—	Within a dist. of 20-25 kms. from Bhima, Don and Krishna	Medium black & Deep black	4	12	58
f) Raichur Plain	Peninsular gneiss	Iron Manganese Copper Gold	Within a dist. of 20-30 kms. from Krishna & Tungabhadra	Deep black	11	20	28
g) Bellary Plain	Peninsular gneiss, Dharwars & Granite	,,	Within a dist. of 10-20 kms. from Chikkahagari & Hagari	Deep black & Medium black	1	9	9
h) Dharwar Plateau	Dharwars & Peninsular gneiss	Iron Copper Gold Tin	Within a dist. of 10-20 kms. from Malaprabha, Tungabhadra, Varada & Kumudvati	Medium red Deep black & Medium black	5	14	32
i) Bijapur region	Deccan trap & Karnul-Cuddapahs	Copper	Within a dist. of 10-20 kms. from Krishna & Malaprabha	Medium black & Deep black	—	13	20
III) SOUTH MAIDAN							
j) Chitradurga region	Peninsular gneiss, Dharwars & Granite	Iron Copper Gold	Within a dist. of 15–20 kms. from Chikkahagari & Hagari	Medium black & Medium red	4	4	10

1	2	3	4	5	6	7	8
k) Tumkur region	,,	Iron Gold	Within a dist. of 10-15 kms. from Veda and Shinsha	Mixed red & black, Medium red	2	7	9
1) Bangalore region	Peninsular-gneiss, Dharwars & Granite	Gold Iron Copper	Within a dist. of 5-25 kms. from Chitravati, Papagni Palar, Ponnaiyar & Arkavati	Medium red Deep red & Laterite	31	54	153
m) Mysore region	Peninsular gneiss	Iron Gold	Within a dist. of 5-15 kms. from Cauvery	Medium red, Mixed red & black	19	26	73


DISTRIBUTION PATTERN OF MEGALITHIC SITES
IN KARNATAKA
0
50
100
KMS
74°
75°
76°
77°
78°
18°
17°
16°
BIDAR
GULBARGA
BIJAPUR
VIBHUTIHALLI
R. BHIMA
R. KRISHNA
RAICHUR
PIKLIHAL
MASKI
R. TUNGABHADRA
R. GHATAPRABHA
R. MALAPRABHA
BELGAUM
DHARWAD
HIREBENKAL
KOPPAL
BELLARY
900
LEGEND
HABITATION
PIT CIRCLE
ROUND BARROW
CHAMBER TOMB
PASSAGE / PORT-HOLED CHAMBER TOMB
DOLMEN
PORT-HOLED DOLMEN
ROCK-CUT CAVE


△ SOME IMP MEG SETTLEMENTS
◉ DISTRICT HQ
• TALUKA HQ.
NOTE: NOS. MENTIONED AGAINST SYMBOLS INDICATE TOTAL NO. OF SITES
KARWAR
BRAHMAGIRI
HALLUR
CHITRADURGA
SHIMOGA
CHIKMAGALUR
TUMKUR
HASSAN
MANGALORE
MADKERI
MYSORE
T. NARASIPUR
MANDYA
BANGALORE
KOLAR
BANHALLI
R. CAUVERY
INDIA
900
150
14°
13°
12°
74°
75°
76°
77°
78°

19. MEGALITHIC CULTURE OF GOA

P. P. Shirodkar

During pre-historic period, Goa too had shown the signs of cultural development as it is evidenced from the stone tools, burins, scrapers, blade flakes and pottery traced during explorations. Other evidences such as rocks, carvings on rocks, boulders and standing stones have been religiously cared for by the people in the region.

In fact, rocks, boulders and standing stones have been venerated as gods or as inhabited by gods throughout the world (Hastings James, p. 864). At some places in the country they are considered as sacred because they have come down as aerolites or thunder stones and are believed to have come from heaven. The people who worship them reason that they have innate power which create reverence and fear. S. A. Sali of the Archaeological Survey of India during the exploratory survey for the pre-historic sites in the region of Goa during 1964–65 had located Early Stone Age tools at Shigaon near Molem. He had also come across Middle Stone Age open camp sites at Arali and Fatorpa. He had also noticed Late Stone Age open air locations below the hilly terrains at Dhargalim, Mandrem, Mopa, Paliem, Korgaon, Parxem, Torxem, Tuem, Colvale, Pilerne, Verem, Amona, Advoi, Nadora, Nanuz, Cuchelim, Conquiriem, Padose, Sarvona, Velage, Ganjem, Honda, Keri, Khadki, Sirsai, Vargaon, Marcela, Priol, Savoi, Verem, Khandolem, Bandora, Khandepar, Betora, Canacona, Colem, Concem, Colva, Cuncolim, Curdi, Gaondongrem, Macem, Malkarne, Molem, Sancordem, Sanguem, Shigaon, Xeldem, Arali, Cotombi, Morpirla, Verna, Nagoa, Dabolim, Nakeri, Bambolim. Carambolim and Divar (IAR, 1964–65; pp. 8–9). This findings also show that the activity of the Early Man had spread in almost all the taluks of Goa. These discoveries helped to prove the evidence of Early Man in the Goa region and they supplemented the studies of K. R. U. Todd, S. C. Malik, H. D. Sankalia, Zeuner, McCrown, S. K. Mishra, G. C. Mahapatra, S. J. Guzder, R. V. Joshi, D. P. Bopardikar on the Bombay - Konkan belt of the Western coast (Marthe, 1983; pp. 104–105).

Neverthless, for want of zealous excavations in the region with the exception of that of the temple site at Chandor in South Goa by Fr. Heras in 1929-30, the evidences of the movements of the man during pre-historic Goa have not come forth as expected. Yet this should not deter anybody from launching the search for the surface evidences which are extant.

As far as megalithic culture in this region is concerned, the attempt is made here to gather as much information as possible, inspite of the limitations of time and facilities, to give an idea of as many evidences as possible.

The region of Goa in fact is no exception to any other archaeologically rich area in the country as far as the existence and erection of the megaliths such as rocks, hoodstones and standing stones are concerned. According to S. P. Gupta, megaliths are the pyramids of the commoners but their origin, chronology, the people who erected them, their daily chores, economic status, religious beliefs are still unknown. Megaliths, he believes, were the only single class of burial monuments which have crossed the boundaries of several countries, continents and physiography. Though there is no uniform international megalithic culture, they are mostly coastal in nature and hence they are widespread in the coastal regions of Europe and Asia (1972, pp. 184-185). It is believed they originated in Oman in the Mediterranean region and gradually travelled towards Western Europe, Middle East and then towards Western India. Stuart Piggot who has called Megalith builders as 'missionaries' and 'megalithism' as their religion (1972, pp. 332-334), it is still a mystery whether the ancient traders who carried the idea to the Western Europe were also responsible for the widespread of it in certain parts of India. Or they were the nomads who continuously migrated from place to place for thousands of years. The period they covered began around 3000 B. C. and reached Europe in 2nd millenium B. C. They reached India only during the initial centuries of the 1st millenium B. C. (1972, p. 185). This has been confirmed from the availability of the cultural implements connected with megaliths in India at Hallur which even date back to earlier period i. e., 1000 to 800 B. C. (1972, p. 186). Since this period coincides with the coming of the Iron Age in India i. e., 1000 to 900 B. C. it can be presumed that the megalith builders in India must have begun to erect these stone memorials during the time of Hallur Culture because only with iron imlpements they could dress the upright laterite stones. But the moot question still remains to be answered and that is whether the megalith builders of Goa were the indigenous people from India or the migrants from the Middle East ? Since no such monoliths are found in Punjab (Hastings James, p. 874) there is areason to believe that the Aryans had not indulged in this sort of 'missionary' work.

The megaliths of Goa are of three types. (1) The non-constructional such as rude upright stones, boulders, rocks, hood-stones and stone circles, and(2) Constructional such as trilithons, dolmens, alignments and Cistvasns. Sometimes they are mistaken as 'Davarnim', i. e., a platform constructed of small laterite stones used as load rests on way. Among the standing stones, menhirs i. e. long stones (see Fig. 1) are prominent. Menhirs in laterite as well as basalt, granite and sand stones are also spread over many villages in the territory. They are mostly laterite upright stones dressed roundish or squarish in shape. Their height and size vary. The huge menhir at Redi near Terekhol, which formed the capital of Goa during the Chalukyas of Badami in the 6th century A. D. is about eight feet in height with uneven shape but is venerated by the people in the locality with great awe. Several rude and irregular quadrangular laterite menhirs have been found by me during the last couple of years and they are located at various places which are as follows:

At Pernem in front of the Ravalnath temple where they are four in number situated at different places (height about 4 feet) ; at Assagaon Bardez one laterite upright of about 3½ feet in size lying in the stream close to the culvert ; two menhirs in Veling which are of over 6 feet in height. One of them is venerated by the Muslims in the locality without assigning any reason and when asked they plead ignorance. The other one which is close to the Vetal temple is dreaded by the Hindus. Both these are about a Kilometre away from each other ; at St. Jose de Areal in Padrichembhat opposite the chapel in Kumarbhat, there are several stonehenges and most of them are laterite uprights of different sizes. This is perhaps the biggest megalithic site containing menhirs found so far. They are in all about 25 and their surface height is of about 2½ to 3 feet ; across the road to Curtorim from the said site there is a stonehenge of the height of about 3½ to 4 feet. In nearby area called Pulamol there are three laterite uprights in the field. In the ward above this area, there are 3 more menhirs ; at Paddem on the road side, there is one menhir, between Paddem

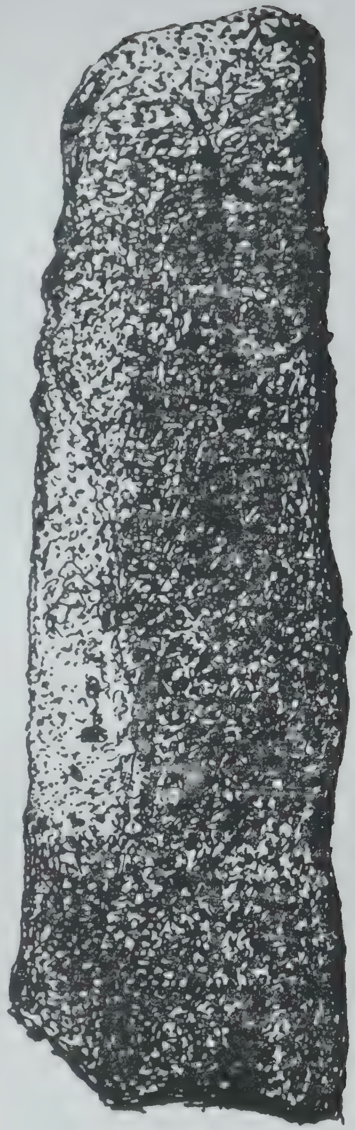


Fig. I. Menhir

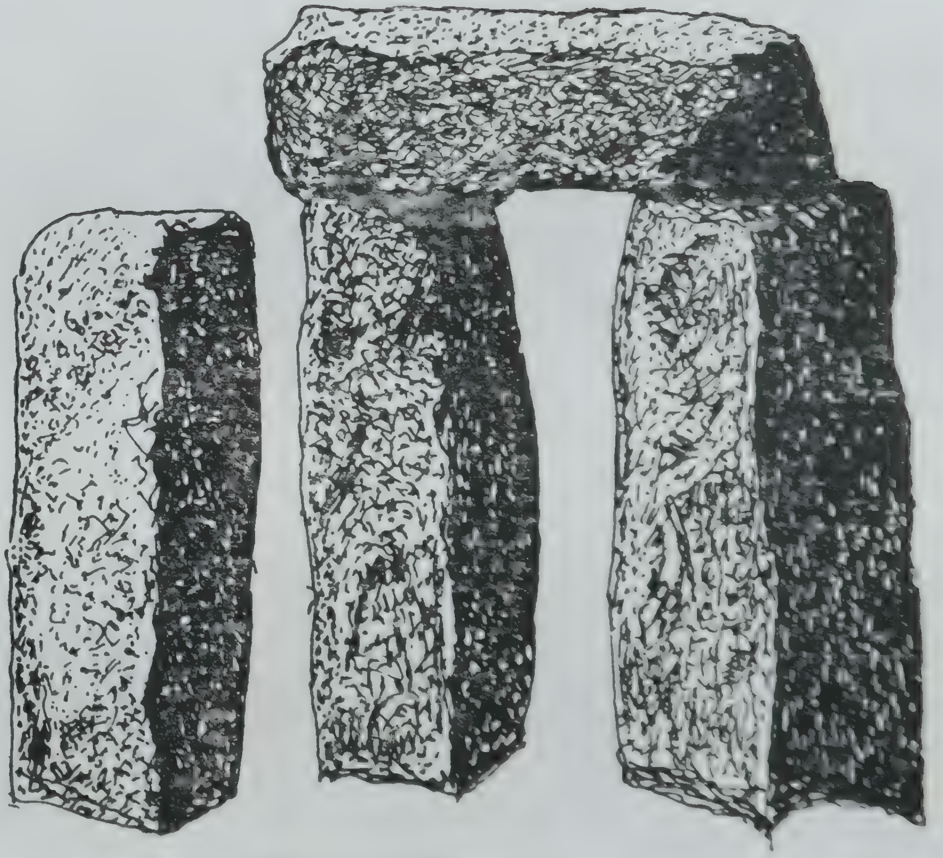


Fig. II. Trilithons

and Quepem there are some menhirs in the paddy fields and their heights vary from 3. 2 to 4 feet ; at Verna down below the Mhalsa temple site area, one laterite upright is noticed; on Chandor to Margao–Sanvordem Road, there are a few menhirs; at Adnem in Quepem there are three stonehenges. At Vhalsi near the Shrimant temple in Bicholim taluk there is an upright of about four feet height; one menhir on the road from Kundai to Mardol is of about 5 feet height; at Shirvai behind the temple of Chamundeshwari, there is a menhir which can be cited as the biggest laterite upright found so far. It is massive as well as longer than any other; at Naroa near Saptakoteshwar temple, one laterite menhir is found buried deep. Besides these laterite uprights there are several basalt and granite stonehenges and hoodstones at several places in Goa. Such stones are found near Mahadeo temple at Tambdi Surla, in front of the Vetal temple at Kakoda, at Gaondongrem in Canacona, Panshi near Sancordem where they are worshipped with great sanctity as Mulpurush. Unlike laterite menhirs, they are rude and irregular in shape and are about three to four feet in height, at times massive as well as thin like flat slabs. They are in cluster as it is in the cases of Tambdi Surla where they are four together and one little away, three at Panshi, five or six of them in two groups at Gaondongrem, little away from the ancient Mallikarjuna temple and eight of them in front of the Vetal temple at Kakoda. At some sites they are erect, and at some spots they are found buried in the inclined position. In Avem near Khotigaon, Canacona taluk there is a rude and irregular granite upright and it lies near an ancient Thadgam. At many a place they are even worshipped as *Barazan* (12 individuals), the earliest settler group of the locality. Barazan is a common feature in many Goan localities. It implies the memorials for the heads of 12 earliest settler families in the particular locality. Since there are no memorials in the names of five or six or ten individuals, it can be made out that the earliest settlers mostly migrated in the group of 12 families only. In Maharashtra too, Poona is believed to have been first inhabited by *Barazan* (Bhave, 1927; p. 188). Taking this peculiar feature into aspect, there is a possiblity that the megalith builders in Goa might have also come in the groups of twelve. This group system continued even later on, the reflection of which is noticed in the age-old Communidades (Community) system of land ownership practically in each and every village of Goa where tha share-holders were only Barazan i.e., twelve villagers.

In some areas like Gaondongrem these megaliths are also worshipped as Brahma though no characteristics of Brahma in the form of carving or multiple heads are seen there in them. In Kumbharmal area of Colem Panchayat in the temple of Mahadeo behind the not so old Linga lies the granite menhir of about 5 feet in height and it is worshipped there now as Swayambhu Linga. Similar is the case with the Vimaleshwara temple at Rivona where the menhir or hoodstone is treated as a Swayambhu Linga.

Rocks and Boulders

i) Near Barazan area of Hudi in Usgaon, the people in the locality worship a sizeable boulder resembling an huge hoodstone namely *Dhan Fator* i.e., a stone of riches. They treat it with great veneration and awe.

ii) The rock in the Chandreshwar temple at Chandranath mount known as *Chandrashila* must have been the object of earliest worship on the place hundreds of years before the first temple was erected there originally by the Bhojas in the 4th century A. D. Perhaps this as well as *Dhan Fator* at Hudi might have been aerolites or meteoric stones like that of Adbhutnath or the 'miraculous god' in Bengal. Near *Chandrshila* at Chandranath, there is a temple of Bhutnath where another queer stone is worshipped. This stone, though later on was worshipped as a 'Gana' of Shiva (Chandreshwar), it must have been venerated there much before the worship of Shiva began there. The Linga of Shiva which is adjacent to *Chandrashila* is also another rock of uneven shape which is worshipped as Swayambhu Linga.

iii) Two huge boulders are venerated in Charao area since ancient times and they are attached a lot of importance in the locality.

Stone Circles

i) Stone circle resembling dolmenoid cist at Bambolim about five kms. from Panaji with about 5-metre diameter is seen near the military camp just by the roadside. Within this circle, there is another ring of stones. The hood-stones are of medium size.

ii) There are four stone circles in Curdi area situated about 8 kms. from Sanguem and they are quite close to each other. The possibility of more stone circles in this area is not ruled out. Another important find in this locality is about 8-ft. image of Mother Goddess carved on the flat laterite rock. The image with no ornamentation whatsoever had a head double the size of the human head. The hands as well as feet are clearly discernible but the nose, eyes and the ears are not seen. Neverthless from the contours and depressions they can be easily made out. This image which is unique of its kind in Goa may be perhaps the earliest form of Mother Goddess available in this region.

iii) At Kakomodi in Quepem on an elevated terrain by the roadside there are two stone circles. The site appears to be one of the oldest in Goa because it has the evidences of a very big settlement there. The stone coffers which are found there indicate the antiquity of the settlement. It is on a hilly area close to which is the stream. A lot of traditions and legends are attached to the site and the people dread to visit the locality even now during night time. It deserves to be thoroughly explored and excavated for the vital clues of the megalithic culture.

iv) At Arabo in Pernem taluk there a stone circle is cited.

v) At Tuem near new road to Arabo and Antibiotics Factory one stone circle is visible.

The possibilty of the existence of several more stone circles in the remote areas and jungle regions is not ruled out. Systematic exploration for their search may throw more light on them.

With regard to constructional megaliths, we come across several trilithons (Fig. II) In these rare mounments two stones on and support the third, laid horizontally across their tops like Jambs or lintels of the doors. Such laterite trilithons are traced in Kundaim, Hadkon, Aquem, Nagarcem. In these cases it is noticed that three uprights are there but the capstone is found only on two of the uprights. They are about 4 to 5 feet in height and are quadrilateral in shape.

Dolmens

As for dolmens in Goa three or more laterite stones on and support one slab lying horizontally on their tops like trilithons, with a trend to rise vartically. The supporting stones like those in trilithons are squarish in shape with the breadth of about

1. 5 feet to 2 feet depending upon the size and height of the monument. Such dolmens all in laterite are found at Balli, Aquem, Madel near Margao. The dolmen at Balli is the biggest and tallest so far found in Goa. Its three uprights are of about 48 inches in height and the length of the capstone is about 80 inches with its ends protruding out of the tops of the uprights down below. In the middle upright, a little below the top there is a hole probably to allow agress to the spirit or for offerings (Fig. III). Such holed uprights which perhaps may be of later origin, are found at some places like Pilgaon and Satpal near Sancordem. The two small laterite uprights in Pilgaon area are having three holes above and the upright at Satpal is having only one hole. These holes are small in size. According to Sidney Hartland, stones with holes are very often sacred. Individuals desirous of being rid of sins or sickness creep or pass through them for that end. He also reveals that the uprights with smaller holes are used by passing hands through to take an oath or swear by a solemn engagement (Hastings James, p. 865). In all the above three cases, the upper portion at the top is curved and not squarish as is the case with most of the laterite menhirs in Goa. The dolmen in Madel has almost fused into a roadside wall and thus lies concealed unless a curious eye detects it.

A typical dolmenoid cist is found at Chandranath mount. It is popularly known as *Gupta Bhandar* (Secret treasure storehouse). In it, it is seen that a capstone stands on two boulders, one of which is roundish in shape and the one is shapeless and rude. Since it is in the vicinity of Chandrashila which is referred to above, it may have a lot of relevance in the megalithic culture.

The alignments are also seen in some parts of Goa. In Devrayee area of Shigaon, six kms. from Colem, there is an alignment (Deshpande, 1984) of 11 uprights of about 5 feet in height and of about 1.5 feet in breadth (Fig. IV). They are roughly dressed stones in laterite like those found in other parts of the territory. This is the biggest and unique alignment not only in Goa but may be in the entire Konkan region. It may be stated that number 11 is quite significant because though alignments can be of two or any number, the group of alignment at Carnac, Brittany are respectively of 11, 10 and 13 (Hastings James, p. 877). This makes one presume that the idea of 11 number of uprights in the alignment must have been brought by the migrants from the West. Pointing out such influences, K. V. Soundara Rajan avers that the Indian megaliths were found to have largely been a maritime impulse inducted into the country by a multiplicity of vehicles with Western seaboard of Indian peninsula serving the potential lines of entries (1980, p. 98).

The other cases of alignments are mostly of two or three uprights in the same line. In some of the cases the third upright is seen cut or worn out or uprooted. Such alignments are traced at Verna plateau, Karemod area of Sancordem (in which the second upright is uprooted and lying nearby), Molem (in which the third upright is worn out and has fallen down) and at Corlim Mallar in Tiswadi right in front of Ciba factory. An alignment of two stones is considered to mark the head and foot of a grave (Hastings James, p. 878). For want of excavations near these stone monuments, this could not be ascertained so far. But the objective behind erecting these rude monuments was either memorial or religious (Hastings James, p. 878).

Cistvaens

Two cistvaens or stone coffers resembling the grave with masonry stone circle at Tumas in Egypt (Gururaj Rao, 1972) are traced at the ancient site of Kakomaddi referred to

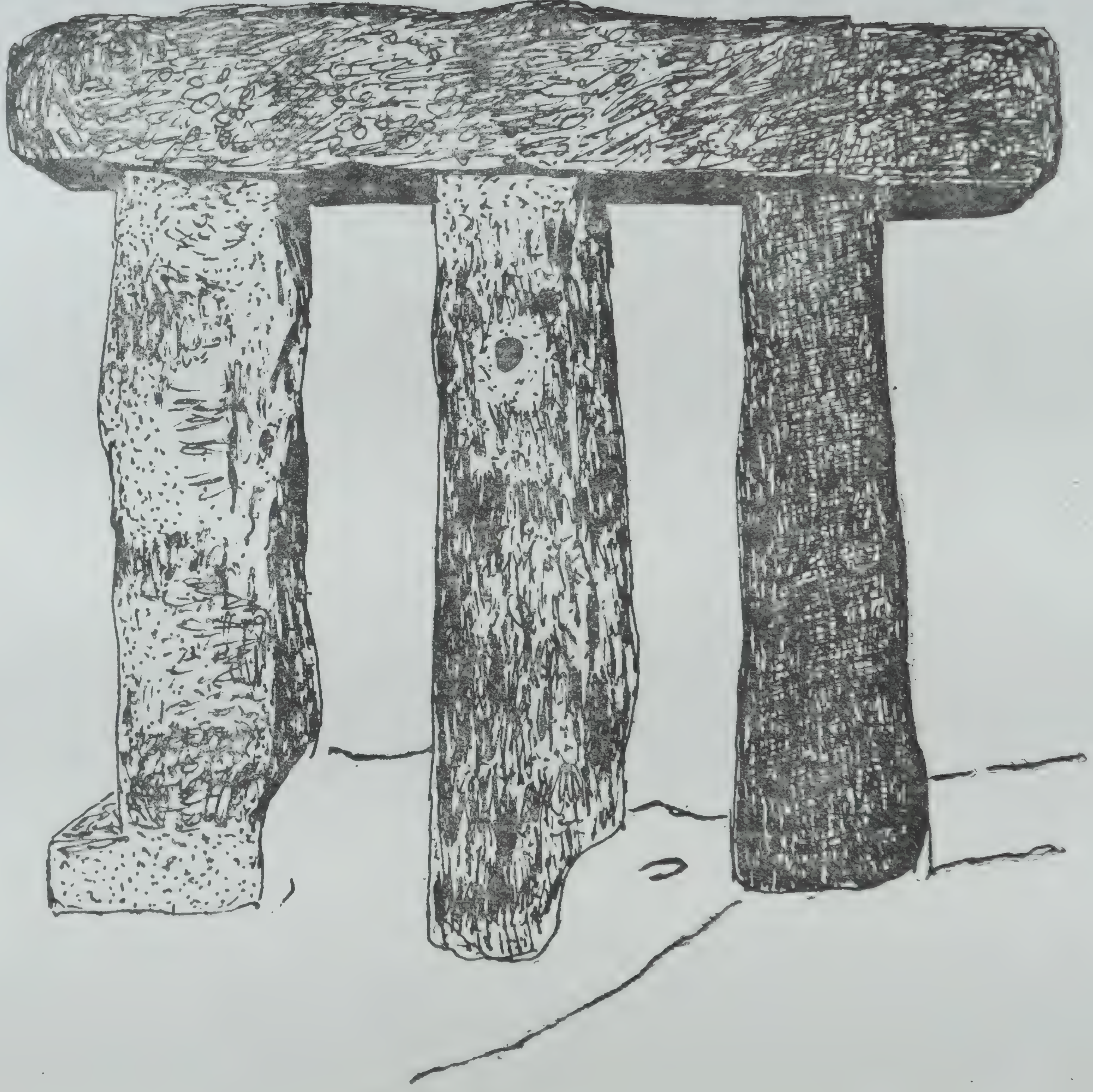


Fig. III. Dolmen

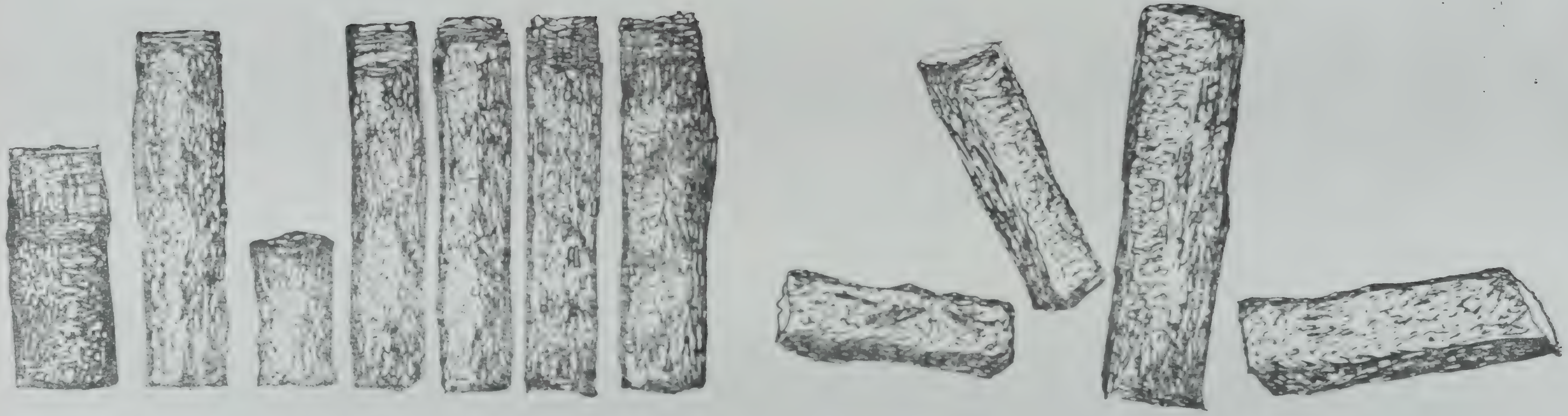


Fig. IV. Alignments

above earlier. They are small cist stones kept one above the other with a slightly deep opening in them. In their vicinity are stone circles which are already discussed above.

Analysing these megaliths in this region, one comes to the conclusion that the Goan megaliths are a variant form of architecture compared to the specimens of megalithic culture in the regions contiguous to it or in the south. The typological and regional forms of megaliths, as Soundara Rajan says, differ from region to region (1980; p. 111). The Goan megaliths especially trilithons and dolemns in laterite keep before us an [illegible] variant form. Most of them must have been erected in memory of the dead rather than with religious objective, with the exception of rocks and boulders. From the size of the trilithon like that of Balli one can imagine the architectural skill as well as manpower involved in the process of erecting it. The spacing of the supporting stones which needed enough firmness to bear the weight of the capstone could be the handiwork of only skilled architect of the time. Who then these people could be is still a guess. In the opinion of Soundara Rajan, the 'megalithism' into India is certainly not to be attributed to any particular single group trafficking in this cult about, but only to indigenous folks collecting these ideas from their voyages to alien shores and lands after the Harappan era, when the Persian Gulf became a halfway and clearing house for the free intercourse between Oriental and West Asian peoples (1980; p. 106). Variations in the megaliths in Goa region, Karnataka, Tamil Nadu, Kerala and Andhra Pradesh indicate the trend of movement of the people of different regions who on borrowing the concepts from the West tried to introduce them in their own way depending upon their geographical and geological surroundings. Another important feature of this megalithic culture is that it is mostly widespread in coastal areas and it indicate clearly the funerary practice of burial as against cremation which was strictly followed by the Aryans.

As it is believed in other parts of the country, it is presumed that these antiquarian stone memorials in Goa too must have been the gravestones of the unknown chieftains. But such a rude and coarse work of quarrying and trimming of laterite monoliths is not common in the southern belt of the country. Such laterite uprights are more visible only in Goa region and some parts of the northern Karnataka like Belgaon and Khanapur. Hence their role in the community of uprights in the country is unique and exceptional.

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20. THE MEGALITHS OF MAHARASHTRA AND KARNATAKA

S. B. Deo

One of the major problems in Indian archaeology has been that of megaliths, though for well over a century and a half research pertaining to this has been carried out in different parts of India, especially the Deccan and South India. A number of stray articles and a score of excavation reports on the megaliths have been brought out. Year after year, new megalithic sites are being tapped and additional data comes up. However, the various aspects connected with the problem of megaliths and megalithism elude solution. Actually, the data collected so far has been so much that it has created some sort of a confusion leading to the proposition of various theories.

It must be accepted that the problem can be better studied, if the data on megaliths is collected and collated regionwise, obviously because there are immense variations even in a given region regarding the typology of megaliths. Fortunately, two such regions, Maharashtra and Karnataka have been relatively comprehensively explored and exploited and results of these are available, along with a number of Carbon-14 dates. Thus apart from the typological comparisons, if any, we are to some extent, in a position to attempt a chronological concordance.

Before attempting some sort of a comparison, it would be useful to have a survey of the nature of data on megaliths in the regions of Maharashtra and Karnataka.

II

Maharashtra

As is well known, the megalithic evidence is found to be concentrated mostly in the Vidarbha region of Maharashtra, though in recent years evidence in this regard has also been reported in the Tapi Valley, in the valley of the Ghod in central Maharashtra and in the southern parts of the Marathwada region contiguous to Andhra. However, in sheer number of megalithic burials and habitation sites, the Vidarbha region outbeats the other sectors of the State of Maharashtra.

Even though notices of megalithic funerary monuments were published as far back as 1871, as for instance by Carey (1871; pp. 238-39) of the megaliths at Khairwada in District Wardha, it is only during the last three decades that relatively intensive work has been carried out. The excavations like those at Tekwada-Bahal, Pimpalsuti Inamgaon, Ranjala and a host of sites in Vidarbha like Junapani, Mahurjhari, Takalghat, Khairwada, Naikund, Borgaon, Raipur and Bhagimohari have given sufficient data to warrant a better understanding of the megalithic culture of Maharashtra.

Typology and Location

Leaving aside the occurrence of the evidence of megalithic contact in the form of megalithic pottery as at Ranjala or Tekwada and Pimpalsuti and the doubtful dolmen at Bhavasari near Pune (which is no longer in existence), the megalithic burials and habitations are concentrated mostly in the region of eastern Vidarbha especially in the districts of Bhandara, Chanda, Nagpur and Wardha. A few are also reported from the regions of southern Marathwada bordering on Andhra.

At Ranjala (IAR, 1960-61; p. 26) in District Dhulia in the Tapi Valley, were found in a pit burial a few human bones along with Black-and-Red and all Black pottery. The shapes and the fabric were typically megalithic. However, no megalith as such was found nearby. It thus appears that the Ranjala evidence, though indicating megalithic contact, does not go much beyond it. Similarly, the data available at Tekwada (IAR, 1956–57; pp. 18–19) again in the Tapi-Girna Valley, exposed burials assigned to Bahal IB phase, gave a pot of the Jorwe chalcolithic tradition along with a connoidal pot of the megalithic tradition (Black and Red) and bearing graffiti. These two pots of two different cultural traditions were found in one and the same burial. Thus Ranjala and Tekwada gave evidence of the expansion of megalithic contact and megalithism in western Maharashtra, the Tekwada data being assigned to the Jorwe phase of chalcolithic culture and assigned on a liberal scale to C. 1000 to 700 B. C. The find of megalithic black-and-red in the late phase of Jorwe culture at Inamgaon in the Ghod Valley further southwards to the Tapi Valley and the evidence of megaliths at Pimpalsuti near Inamgaon, further confirmed the megalithic contact in western Maharashtra. The dolmen, the account of which was published long back by Sankalia (1939–40; pp. 178-84) was a solitary example and was in worship by the pastoral Dhangars then. Hence we need not take much notice of it as there are no other similar megalithic monuments nearby.

Since the above mentioned megalithic evidence is both sporadic and not in the form of pure megalithic monuments but in the form of contacts as at Tekwada, Ranjala etc., it is not possible to deduce any generalisations regarding the typology as well as the physical environment associated with these. The Ranjala evidence pertains to a pit burial whereas Tekwada is more in line with chalcolithic burials. The solitary evidence of Bhavasari has not given any indication of a megalithic burial but more in the form of a dolmen-shrine. Therefore, in the consideration of typology and location, we have to take the help of mostly the Vidarbha evidence.

In the region of Vidarbha there are scores of megalithic sites, a few of which are habitation sites as well. The better known which have been excavated so far are Junapani, Tekalghat, Khapa, Mahurjhari, Borgaon, Naikund, Bhagimohari, Khairwada and Raipur. However,besides these several others have been reported mostly in the districts of Bhandara and Chanda. The largest amongst these, in so far as the number of megalithic burials is concerned, is the site of Khairwada in District Wardha which was first tapped by Carey in 1871 and which has as many as fifteen hundred stone circles. The others which have stone or cairn circles in hundreds are Junapani, Mahurjhari, Naikund, Bhagimohari and Raipur, the last close to Nagpur.

So far as the typology is concerned, the cairn-circle is by far the most widespread and recurrent type in Vidarbha. It represent nearly 99.7 percent of the megalithic monuments. In earlier writings there are references to other types, as for instance, cromleches at Tilota Khairi (AR, ASI, 1928–29; p. 37) in Bhandara; those at Chamursi (AR, ASI, 1924–25; p. 172) in Chanda District, and cromleches or dolmens at Keljhar and Mul between Chanda and Markanda. We also come across the mention of a dolmen in Bhandara District as listed by Dikshit (1954). However, these are mostly in the form of exceptions to the general prevalence of the cairn circles. Recently the evidence of a cist and a central chamber of undressed boulders within a cairn circle has been brought to light at Raipur near Nagpur and double chamber and a smaller circle of smaller stones within a cairn-circle has been excavated at Bhagimohari (Pl. I & II). It is thus clear that the cairn-circles which run in number in thousands are the fossil type of megalithic burial in Vidarbha. It may be mentioned here that cairn-circles have not so far been reported at least in intact form-in western Maharashtra. In summary it may be stated that the following types have so far been evidenced :

(i) Cairn circles
(ii) Cairn circle with a cist in the centre
(iia) Cairn circle with a chamber of undressed boulders in the centre
(iii) Cairn circle with double chamber of smaller boulders in the centre
(iiia) Cairn circle with a smaller circle of smaller boulders in the centre
(iv) Dolmens (as at Keljhar, Mul, Chamurshi and Pimpalgaon : not verified)

So far the physical location is concerned, it may be noted that the burial or cemetery sites are found near flat hills with abundant supply of pebbles and boulders whereas the megaliths of Raipur were concentrated on both sides of a dyke which provided the raw material for the creation of a cairn circle. It may further be mentioned that these cemeteries were also close to nalas which must have provided water for burial rituals.

The nature and location of habitation sites of the megalithic people show a different set up. Whereas no megalithic habitation site has so far been located in western Maharashtra, in Vidarbha the sites of Takalghat, Naikund, Bhagimohari and Khairwada have given evidence of extensive megalithic habitations. Before going into the details of these, it may be mentioned that Kaundinyapura in Amaravati District and Paunar in Wardha District as also Arni in Yawatmal District have given evidence of the first habitations having megalithic contact on the basis of the occurrence of black-and-red ware with graffiti and typical iron artefacts like adzes etc. recovered elsewhere in megalithic burials and habitations. These indicate the fact that whereas eastern Vidarbha had extensive megalithic settlements, the regions of mid-western Vidarbha also had megalithic contacts. The painted black on red ware at Kaundinyapura and Paunar is similar to the painted ware found in some megalithic burials and habitational deposits.

The locational distinction of megalithic habitational sites calls for a comment. These have been found invariably on the banks of perennially flowing rivers, as for instance, Takalghat on Krishna, Naikund on the Pench, Bhagimohari on Kolar and Khairwada on the Dham river. However, it may be mentioned here that the source of pebbles and boulders required for the construction of a burial was not far away from such habitational sites. Perennial supply of water was essential for habitation, but not necessarily for a cemetery. This distinction is clearly evidenced by the location of habitation and cemetery sites of the megalithic people so far as Vidarbha area is concerned.

The magnitude of habitational sites in terms of area covered can be understood on the basis of measurement of such an area. For instance, Takalghat has an habitational area admeasuring 1.3 hectares and number of megaliths 87; the area of habitation at Naikund is 15 hectares and the number of stone circles 93; that at Khairwada is 20 hectares and the number of cairn circles is 1496; and the habitational area at Bhagimohari is 5 hectares and that of burials is 182. The other sites mentioned earlier like Mahurjhari etc., are purely cemetery sites. At the habitational sites, the deposit varies between two and one metres, which is purely megalithic on the basis of the fact that the material remains encountered in the habitation are identical with those found in the burials.

Material Culture

The material culture (Deo, 1968, 1970, 1973, 1982, 1984 pp. 22-24 & 1985; pp. 89-99) associated with the megaliths in

Maharashtra, especially in Vidarbha area has certain distinctions of its own. As has already been mentioned earlier, the megaliths in western and northern Maharashtra show contact with the late chalcolithic Jorwe culture. However, the Vidarbha megaliths have not given any evidence so far of such a contact. Actually, there are no chalcolithic sites in Vidarbha so far known, except that of Tuljapur Garhi in Amaravati district excavated this year on a small scale by the Archaeological Survey of India, in which evidence of Malwa and Jorwe pottery has been for the first time attested. However, there are no megaliths nearby, nor have the excavations given evidence of any megalithic contact. The evidence of houses has not been much though it has been reported from Takalghat, Naikund, Khairwada and Bhagimohari. The general pattern seems to be to have a house either rectangular or circular on plan with well-made lime-plastered floors, (pl. IV) walls of clay and light roof, supported by wooden posts. No brick, either fired or unfired has so far been evidenced. These indicate, therefore, not a very permanent settlement.

By and large, therefore, the ceramic evidence associated with the megalithic burials and habitations in Vidarbha, resolves itself into five categories : (1) the black-and-red (2) all black burnished (3) the micaceous red (4) plain red, and (5) painted black-on red. In terms of quantity the micaceous is the maximum both in habitation and burials. Between (1) and (2) the latter is more than the former, whereas (4) is decidedly more in habitation and less in burials. It may also further be pointed out that the painted ware is not associated with all the burials.

So far as the ceramic typology is concerned, it may be stated that the black-and-red ware which is usually glossy and thin, restricts itself to a variety of rimless bowls and dishes. Some of these have graffiti on the external surface which has mostly linear motifs. That this graffiti sometimes also included artistic delineations has been attested by a sherd from a cairn circle at Raipur which shows a stylised animal with elongated body and a short hump. The all black, however, shows a better range of shapes in the form of rimless bowls, dishes, lids and covers, small basins and a distinctive type of lid with tapering top crowned by a motif of four birds or a ram. Besides these, there are short hour-glass-like stands and bowls with connoidal base. The micaceous red is abundant – relatively slightly more so in burials than in habitation – but brittle due to the mixture of large flakes of mica in clay and ill firing. The shapes associated with this are medium size jars with globular body and flaring mouth, platters and doughs and basins. It appears that some of the micaceous pots had linear paintings in black which is essentially pre-firing. It may be noted that this ware is absent in the megaliths of Karnataka and Tamilnadu. It appears, thus, to be a local product as a clay in Vidarbha, at least in eastern district is full of mica. It is likely that this was more a funerary ware as it could not be used much in everyday life because of its brittleness. The coarse red ware is not much in quantity so far as burials are concerned but it is found in reasonable quantities in the habitational deposits. It shows limited shapes like dishes, bowls, basins, storage jars and medium size vases as well as platters.

The most noteworthy among the ceramic collection of Vidarbha megaliths is the painted pottery painted black on red. The first evidence of this came from Junapani where a cairn circle gave a spouted bowl bearing oblique strokes in black on the rim. Unfortunately, no details are available nor a full photograph of this has been published. In the absence of this, therefore, it is difficult to compare this with either the earlier chalcolithic painted pottery–for, Jorwe has the fossil type painted spouted bowls – or the other painted types from the cairn–circles in the area. This painted ware from the megaliths is thick in fabric, bearing a slip externally, with clay containing a lot of degraissant, not well fired and the paintings being entirely linear and geometric. In fabric as well as typology, it has no similarity with the Chalcolithic Jorwe ware. It is more abundant in habitational deposits, whereas it is not found in the burials of all the megalithic sites. For instance, only the burials at Mahurjhari, Naikund, Raipur and Khairwada gave these. However, all the habitational sites have so far yielded these. It may be mentioned here that the first occupations at Paunar and Kaundinyapura also have given a few painted sherds along with typically megalithic iron artefacts, though these are mixed up with early historical evidence as well. It may, therefore, be not wrong to propose that these painted sherds owe their ancestry to the megalithic people. Whether they adopted them from some other contemporary non–iron culture – for which there is not much evidence so far except at Tuljapur Garhi –, or evolved it themselves remains a mute question.

In terms of metal artefacts, the Vidarbha megaliths are exceptionally rich as they have given hundreds of objects of iron, copper, gold and electrum. The variety and quantity of objects of iron - more in burials than in habitation, though the typology is similar is astonishing and can be explained by the fact that megaliths in Vidarbha are concentrated in an area which is rich in iron and manganese. The paucity of these in western Maharashtra might explain the sporadic nature of megalithic remains. It is worth mentioning that the areas of megalithic density and iron ore and coal density tally which explains the abundance of megalithic remains in the eastern districts of Vidarbha. To substantiate the assertion that the local iron deposits were tapped by the megalithic people is borne out by the find of an iron smelting kiln of clay (Deo & Jamkhedkar, 1982; pp. 56/ff) used to smelting iron. It is dated by C_{14} showing to the sixth century B. C. and thus forms the of earliest and certainly pre-Historic evidence iron smelting in Maharashtra(pl. V). No early historic site has given such an evidence so far. No such evidence has been available from Karnataka though Sundara (Sudara, 1975; p. 178) thinks that the ash mounds "were probably even for smelting iron", in north Karnataka. Even accepting this must be pointed out that no remains of an iron-smelting kiln have been found there.

Apart from the variety of objects of iron like daggers, swords, tridents, spears,spikes, lances, etc.; chisels; (pl. VI) nail pavers; frying pans, hoes and sickles, and a variety of other objects the distinguishing feature of this industry is the high purity of iron, sometimes as high as 98% and 99% qualifying it to be as hard as steel. There also has been evidenced of carbon added to make the artefacts sturdy. There also appears to be a preference for rivetting different parts with iron pins as for instance. the handles of a frying pan, the three parts of a copper pot, the tongue of a copper bell and the decorative numbers on horse ornaments rivetted with iron pins. Such composite object has been best illustrated at Mahurjhari (pl. VII) where we have a dagger with iron blade and copper hilt. Such evidence has not so far been reported from Karnataka though Yeleswaram in Andhra has yielded such an evidence.

Yet another remarkable aspect of Vidarbha megaliths is the large number of copper/bronze objects associated with burials. The copper objects recovered in these comprise of dishes, lids with decorative finials in the form of birds, buds etc., solid bangles and ornaments made of thin copper sheet for the face of the horse(pl. VIII). It is no exaggeration to state that the number of copper objects recovered in megalithic burials far exceeds the number of such objects recovered in all the chalcolithic sites in Maharashtra. This is surprising because copper has been relatively scarce as compared to the abundant availability of "the democratic metal", i.e., iron. It is surprising that sometimes in a single female burial, as many as sixtysix copper bracelets or bangles have been recovered. It is likely therefore that the megalithic people knew the source of copper though evidence of smelting has not been so far available, or that they got these readymade from extraneous source.

The objects of gold are by far the minimum and restrict themselves to a few burials as at Mahurjhari, Junapani, Naikund and Raipur. These consist of necklaces and earstuds and spirals and a few rings. These show a high purity of gold. The restriction of these ornaments only to a few burials implies economic gradation in megalithic community.

The Burials

As stated earlier the dominant burial type in Vidarbha has been the cairn-circle. In western Maharashtra, the Ranjala evidence shows pit burial, possibly under the influence of the chalcolithic people as Ranjala has been in a region which has extensive chalcolithic settlements.

However, inspite of the cairn circle dominating the Vidarbha region, the following peculiarities are worth noting :

1. At most of the burial sites, except in a few cases as at Mahurjhari, the burials are secondary consisting of a few bones and teeth.
2. These human remains are not placed in a circle at a fixed spot but can be found anywhere, but mostly on the virgin rock face of a circle.
3. In several cases, bones of more than one individual can be found in one circle.
4. No child burials have so far been found in Vidarbha megaliths.
5. At Mahurjhari, there was evidenced quite a variety in burial modes as for instance, full skeletons; twin skeletons (pl. III) full skeletons at different levels of filling indicating that the same stone circle was used for burial with a gap of time; even within a circle, some skeletons were placed right on virgin rock while some were placed in a rectangular pit dug in rock and given a bedding of black clay over which the body was placed.
6. There was no fixed orientation for the placement of a skeleton.
7. Even in the case of a cairn circle with a cist in the centre or a chamber of boulders in the centre as at Raipur, or a double chamber smaller pebbles or a smaller circle in the centre within a cairn circle as at Bhogimohari, the skeleton remains werefound outside these chambers but within the cairn circle.
8. In some burials, the remains of a horse sacrificed as funerary ritual were recovered, along with elaborate ornaments of copper sheets for the face, copper bells for the flanks and iron bits. No stirrups were encountered in any megalith in Vidarbha so far. However, no such horse trappings have been reported from Karnataka, though Andhra megaliths have given stirrups and iron bits.

9. It has been generally observed that larger cairn–circles have yielded a larger number of antiquities, including the remains of a sacrificed horse and in some cases gold ornaments as well as exotic objects like lids of copper or terracotta with distinctive finials.

10. Inspite of some variety in the burial architecture in the form of cists, central chambers of boulders or medium-size pebbles or pits, by and large the cairn–circles dominate. These variations in the burial pattern are marginal and may indicate the existence of sub–groups within the megalithic communities, and

11. The cairn use basalt and trap, though at Bhagimohari and Raipur there are cases of the use of reddish and whitish sandstone which is available nearby.

The People

The fragmentary skeletal data does not warrant any generalisation regarding the ethnic traits of the Vidarbha megalithic people. However, some observations by Kennedy (Deo & Paddayya, 1985; pp. 93-97) on the Mahurjhari skeletons are interesting and worth quoting. They are as follows :

1. The skeletal remains are of 17 to 21 individuals.

2. There are remains of two individuals in one megalith, whereas in yet another possibly three individuals were interred.

3. The age–wise composition is as follows :
    (i) Infants – Nil
    (ii) Age group 12–15 – One
    (iii) Age group 16–22 – Eight
    (iv) Age group 22-32 – Four

4. Middle–age and old-age adults are not present.

5. In age group 22-32 : all are males.

6. In age group 16-22 : all are females.

7. Massive pilastering of the linia aspera of the femora of two males suggests an occupational – habitual stress pattern of excessive adduction of the thigh and postural stabilization.

Because of the shattered nature of the skulls, it was not possible to arrive at ethnic and racial identification of the skeletal data.

The Economy

It was believed that the megalithic people were nomadic as there was a paucity of habitational sites of these. However, direct evidence of grains, indirect evidence of agricultural tools like sickles and hoes and the dental pathology of these people have helped in a better understanding of the economy of these people.

The excavations at Bhagimohari have given evidence of grains retrieved through the Floatation technique. These include rice, barley, wheat, black gram, lentil, common pea, grass pea, horsegram, hyacinth bean and Indian jujube and wheat, black gram and pea at Naikund. Sickles and hoes have been found at most of the habitation sites of the megalithic people in Vidarbha. There is also evidence of large scale domestication of cattle useful for agriculture. The evidence of caries in human teeth might indicate the intake of soft vegetarian food (along with non–vegetarian one).

Chronology

Whereas the chronology of Karnataka megaliths is based mostly on C_{14} dates available at Hallur, though these come from the overleap between the Neolithic and the megalithic, the chronology of Vidarbha and western Maharashtra megaliths has been attested by a series of C_{14} dates and suggest contact between the end of the Jorwe chalcolithic culture and the megalithic. The crucial C_{14} dates so far available are as follows :

1. Takalghat (TF dates) :
   555 ± 100 BC Mid phase of megalithic
   615 ± 100 BC habitation.
2. Khairwada (BS dates) :
   510 ± 100 BC Layer 4. i.e. mid-phase
   490 ± 100 BC of megalithic habitation
3. Naikund (BS dates) :
   (a) Cairn circles :
   505 ± 100 BC
   545 ± 100 BC
   (b) Megalithic habitation :
   Md. I : 520 ± 100 BC Earlier phase
   530 ± 120 BC of habitation
   Md. II : 690 ± 110 BC Early phase
   300 ± 100 BC End phase
4. Bhorgimohari (Habitation)
   750 ± 100 BC — (9) Layer
   690 ± 100 BC — (8) ,,
   620 ± 80 BC — (7) ,,
   (First habitation : Layer 9)

It will thus be clear that the beginning of the megalithic habitations in Vidarbha can be safely placed in the 7th-8th centuries BC. This tallies well with the relative dates of contact between the megalithic and the end Jorwe of C. 700 BC as at Inamgaon. However, taking into consideration the fact that several of these dates come from the mid-phase of occupation, it may not be illogical to say that megalithism may have appeared in Maharashtra about the beginning of the first millennium BC.

There is yet one more significant factor which has to be stated here.

In Karnataka, the skeletal data in megalithic context has been grouped into (a) Autochthonous Australoid type and Proto-Australoid as Veddid type (b) type similar to the al'Ubaid type, and (c) mesobrachy-cranial types of probably Scytho-Iranian stock, which do not agree with (a) or with Indo-Aryan. However, such a classification has not been possible in respect of the megalithic data in Maharashtra. It may, however, be pointed out here that the horse ornaments recovered in Vidarbha megaliths have central Asian parallels.

In summary, the distinctive features of of Maharashtra megaliths may be stated as follows :

(1) The dominant burial type is cairn circle.

(2) The concentration of megaliths is in the eastern districts of Vidarbha.

(3) There is evidence of contact between the megalithic and Jorwe Chalcolithic cultures in Western Maharashtra.

(4) The C_{14} dates indicate that the megaliths in Maharashtra go back to at least 8th Cent. B.C. if not earlier.

(5) The iron and copper objects associated with these are varied and large in number.

(6) There is evidence that the local iron ore was smelted by these people, and

(7) No observations can be made regarding the racial and ethnic traits of these people.

III

Like Maharashtra, the researches pertaining to the megaliths in Karnataka, especially northern Karnataka, go back to a period at least a century and a half as Meadows Taylor (1851-52) was the first to excavate the megaliths in the district of Gulbarga, between 1851 and 53.

Subsequently several scholars carried out investigations with the help of explorations and selective excavations of megalithic sites, mos ly burials, though quite a few also tapped some habitation sites as well.

It is needless to take an exhaustive review of the work done so far. Instead of that, a few landmarks may be stated with a view to focus attention on significant contributions. As is well known, Wheeler (1948; pp. 181–308) was the first to propose a chronological framework to the megalithic remains at Brahmagiri which he placed from C. 2nd B.C. to the middle of the 1st Cent. A.D. A systematic survey of the geographical distribution and typology was undertaken and credit must be given to the late V. D. Krishnaswamy (1949; pp. 35-45) for putting forth for the first time a reasonable typology of South Indian megaliths.

Since then, however, a good amount of work has been done by a number of scholars, notably by Dr. A Sundara (1975) Gururaja Rao, (1972) who has brought out a fund of new information on the megaliths of Karnataka. Though earlier to him the late lamented Dr. M. Seshadri had worked in the old Mysore State area, the work by Sundara has touched several new aspects of the megalithic remains though mostly of north Karnataka. He shall brought out new megalithic types, has proposed a comparative dating of these, thrown light on the material culture of the megalithic people and proposed a relative sequence in terms of time-scale to different types. Dr. Gururaja Rao has also taken a good review of the Megaliths in south India. It is, therefore, on the basis of the work of these scholars that the salient features of Karnataka megaliths and their comparison, if any with those of the Maharashtra region can be attempted.

Location and Typology

Whereas in Maharashtra, the megaliths are mostly concentrated in the eastern Vidarbha region, and have the dominance of one type, i.e., cairn circle, the evidence in Karnataka is different. Megalithic burials have been found well scattered both in southern and northern Karnataka as well. By 1974, Sundara has located as many as 224 megalithic sites in the eight districts of north Karnataka alone. It will be apparent that this number is far less as compared to number of megalithic sites plotted so far in Vidarbha. As has been mentioned earlier, at Khairwada alone there are nearly 1500 cairn circles. Prima facie, therefore, it appears that the Vidarbha region is richer in terms of the number of megaliths as compared to those in Karnataka. However, so far as the typology is concerned, Karnataka offers a richer and wider variety of megalithic burials than Maharashtra. He has listed as many as ten megalithic types (Sundara, 1975; p. 188) most of which are absent in Maharashtra.

To quote him, north Karnataka gives the following type.

1. Passage chambers and small square chambers.
2. Port–holed chambers of the type found in Brahmagiri.
3. Port–holed chambers of the types found in Rajankolur and Hire Benkal.
4. Oblong cists including dolmenoid cists and cist circles.
5. Pit burials
6. Pit circles
7. Round barrows
8. Stone alignments and Menhirs
9. Irregularly polygonal chambers
10. Rock shelter caves

It is further pointed out that port–holed dolmenoid cists with passage found in Aihole–Hagaratgi area have no parallel outside north Karnataka.

It will thus be clear that in respect of the variety of megalithic funerary architecture, the Karnataka area is richer than Maharashtra. Whether these types represent different ethnic groups within the megalithic cannot be answered at the moment unless the skeletal data and material equipment so warrent. However, a detailed comparison even between a specific type of a particular region with that of other region – as for instance, the Passage chamber tombs of the Konnur and Kaladgi type (Sundara 1975; p. 159) bring out significant variations.

However, there is one aspect which appears to be common both to the Maharashtra and Karnataka megaliths, and that is in respect of the paucity of habitation sites. In the Vidarbha area though scores of cemetery sites are known, so far only four habitation sites – Takalghat, Khairwada, Naikund and Bhagimohari – have been brought to light. The case in north Karnataka is not much better, as only six or seven habitation sites have been located.

So far as the locations of megalithic cemeteries are concerned, it has been pointed out (Sundara, 1975; p. 155) that there is generally a "heavy concentration of megaliths in the hilly areas overlooking rivers". This, it has been observed is particularly the case with regard to the Passage Chambers. Besides this, the megalithic people also seem to have preferred "terraces of hills or stony waste lands". However, wherever, raw material was available, they also constructed tombs in plain areas. But the placement of habitation sites of the megalithic people in north Karnataka has shown that they preferred regions "near the hill valleys from which rain water flows into the fields cutting in fact a part of the site... and within the catchment areas of the bounded water of the present irrigational tanks raised across the valley."

When compared with the megalithic sites in Maharashtra, it is clear that the norms taken into consideration for cemeteries and habitations are more or less identical. The cemeteries in Vidarbha are also situated near terraces of low hills with abundance of pebbles or stony waist lands as at Mahurjhari, Borgaon and Raipur. The habitations at Naikund, Takalghat and Bhagimohari are on the banks of perennial rivers which get supply of water from the slopes of nearby hills. However, it appears that some of the habitation sites in Maharashtra are very extensive as at Khairwada which also account for the maximum number of megalithic burials.

It is also significant to note that certain specialised burial modes required specific type of raw material, as for instance the cist or the dolmen. This will explain the paucity of cists and dolmens in Vidarbha area but their occurrence in Andhra and Karnataka. For simpler modes like pit burials or cairn circles not much of a specific type of material was required.

However, yet one more significant factor which is common to the megaliths of Maharashtra and Karnataka is the fact that the megalithic sites in both these regions are concentrated in regions which are rich in iron ore. As has been stated earlier, the maximum concentration of megaliths in Maharashtra is to be found in the eastern disiricts of Vidarbha which are extremely rich in iron deposits. That these were exploited for turning out iron artefacts on a large scale has been proved by the find of iron-smelting furnace at Naikund datable on C_{14} showing to 6th–7th Cent. B.C. Similar has been the case in Karnataka where the megalithic sites are found to be close to iron and gold bearing areas. This was brought out long back by Munn (1921; pp. 1–11). The sites of Hire Benkal and Maski are classic examples of these. Inspite of this, it may be pointed out that no direct evidence of iron-smelting has so far been available in Karnataka. The secrets of the

AshMounds are yet fully to be comprehended.

The Burials

The evidence of the interment of human dead in the megaliths of Maharashtra has not been uniform as also the orientation of the dead. However, by and large, the Maharashtra megaliths show secondary burials in the form of the placement of a few long bones and teeth. There are, of course, exceptions as well, as at Mahurjhari where full human skeletons placed in extended fashion have been recovered. Save Mahurjhari, all the other sites in Maharashtra, especially Vidarbha, have given evidence of fractional burials. Such a variety has also been evidenced in Karnataka (Sundara, 1975; pp. 168 ff) megaliths as well. Moreover, it has also been noticed that in several cases, the megalith has been utilised to bury the remains of more than one individual.

The outstanding feature of some of the cairn circles or stone circles in Vidarbha is the evidence of the sacrifice of the horse and burying the head and a few long bones with the human dead. This has been evidenced at Mahurjhari, Khapa, Bhagimohari, Borgaon and Naikund. However, such a feature was restricted to a few megaliths implying that only the economically affluent could afford to sacrifice the horse and bury some of its parts along with exquisitely made ornaments for it. It has been observed on the basis of the skeletal data of the horses so far encountered, that almost all of these sacrificed creatures were young, around three and four years of age and further that the full skeleton in any case was never recovered indicating the possibility that possibly the rest of the portion was consumed by the community or the relatives of the dead. The evidence from Karnataka is not clear for Sundara (1975; p. 171) speaks in rather ambiguous terms when he refers to pit burials and pit circles with which, sometimes a ritual of "sacrifice of animals" was associated. What these animals were is not clear. In the list of iron objects recovered from various megaliths there is no mention of iron bits or any other equipment associated with the horse, either in iron or in copper. This shows that whereas horse was sacrificed and buried with the dead in Maharashtra, there is no evidence of this feature in Karnataka so far.

Material Culture

The material culture associated with the megaliths in Maharashtra and that with the Karnataka region present some interesting features, which may be summarised here.

As in Maharashtra, the ceramic evidence shows identity both in fabric and typology, in habitations and burials. The Karnataka megaliths show basically four fabrics; to wit, the black and red, the all black, bright red and coarse red. While it is not possible to go into exhaustive typological details here, it is significant to state here that the micaceous red ware and the painted black on red encountered in Vidarbha megaliths are totally absent in Karnataka. Taking into consideration the fact that a series of C_{14} dates of Vidarbha megaliths vere round 7th-8th Cent. B.C. i.e., the end phase of the Chalcolithic painted pottery culture and that there has been evidence of megalithic and Chalcolithic contact as at Inamgaon and Tekwada and further the discovery of a Chalcolithic site in western Vidarbha at Tuljapur Gadhi, tempt one to propose that the megalithic people might have adopted the idea of painting pottery from the Chalcolithic people. Such a possibility has not yet been forthcoming in Karnataka where the overlap has been between the Neolithic and the megalithic. However, it is argued that Hallur black-and-red ware is typologically analogous to the Chalcolithic black-and red.

There is also a significant feature which deserves mention in respect of iron objects. It will be at once clear that the number and types of iron objects encountered in Karnataka megaliths is far less than that recovered in the megaliths of Vidarbha. The types which are common are spearheads, lances, sickles, daggers, axes and chisels. However, no Vidarbha megalith has so far given tripod stands and saucer lamps. The Vidarbha megaliths have given quite a range of chisels, spears, long spikes and the most important, composite tools like daggers with iron blade and copper hilt, bells of copper with iron tongue and horse ornaments of copper sheets with decorative members fixed with iron pins. Similar has been the case with copper objects which are sumptuously numerous when compared to those recovered in south Indian megaliths as a whole. Actually, copper objects have been rare in Karnataka megaliths.

Economy

There is unmistakable evidence of the fact that the megalithic people were practising agriculture in Vidarbha. Apart from the find of sickles and hoes, the recovery of grains like wheat, barley, lentil etc. in the habitational deposits at Bhagimohari and Naikund has already been referred to earlier. No such evidence has been so far reported on such a scale and such a variety in Karnataka except at Hallur (Kajale, 1974; p. 55 ff). As the evidence stands, therefore, the Vidarbha megalithians appear to be relatively better settled agriculturists as the available evidence indicates.

The People

The study and analysis of the human skeletal data from Karnataka has not been that decisive so far. However, some of the sites like Maski, Brahmagiri, (Sarkar, 1960; pp. 5-26) Yeleswaram, Sanur and Adichanallur has shown quite a range of ethnic groups. However, three dominant ones are (Sundara, 1975, p. 188) :

a) Autochthonous Australoid type and Proto-Australoid as Veddid type.

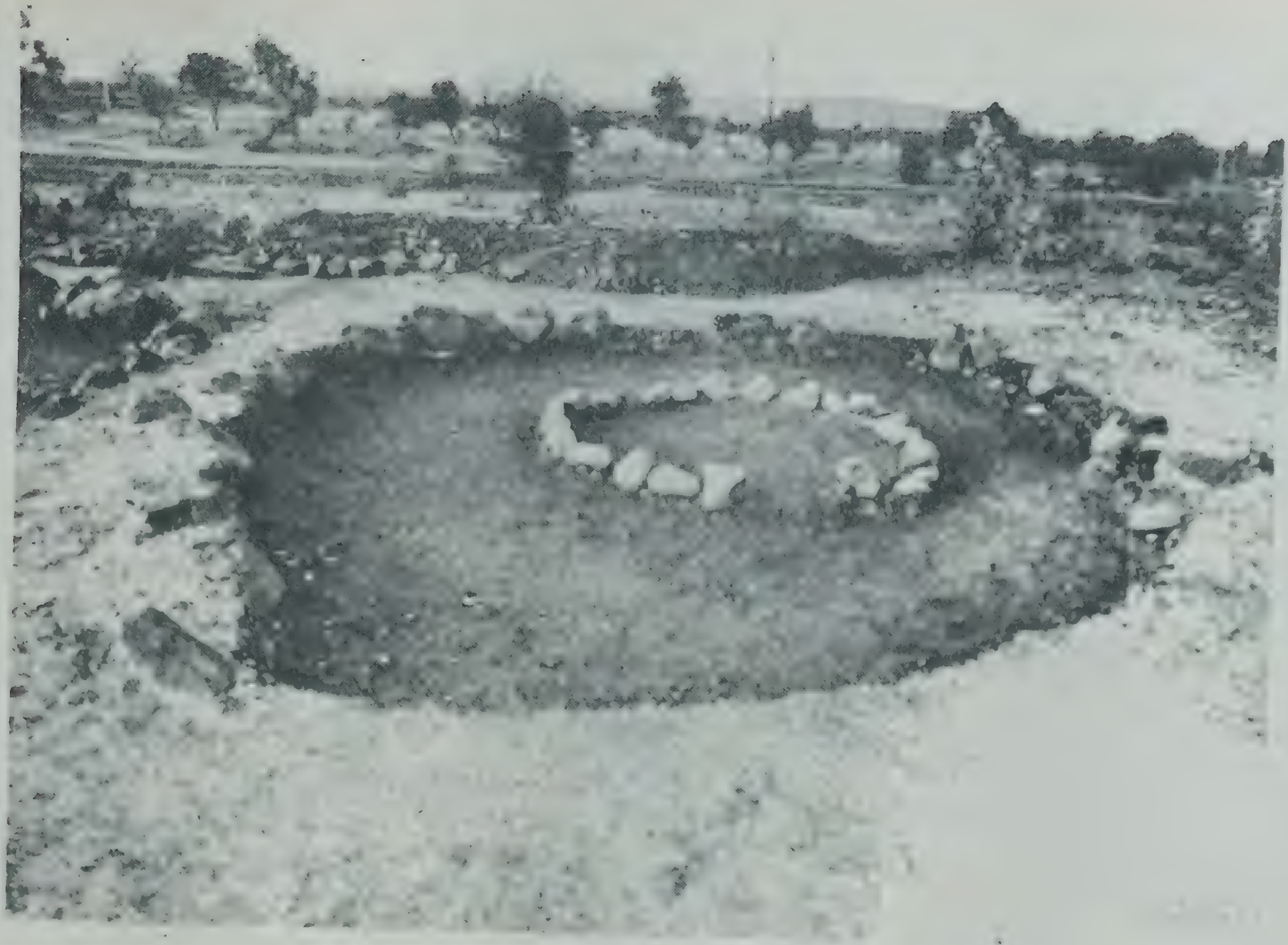
b) Type similar to the al 'Ubaid type

c) Meso-brachy-cranial types of probably Scytho-Iranian stock.

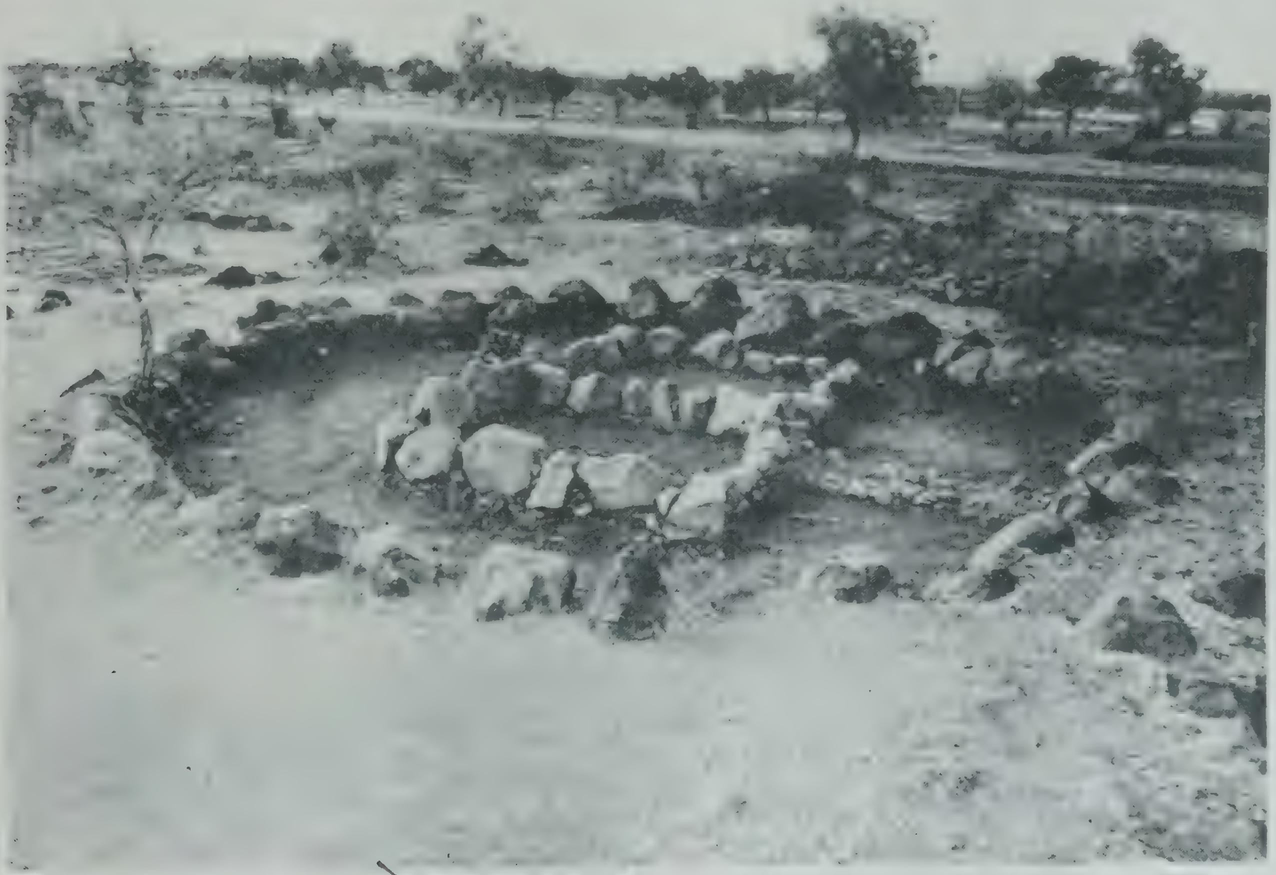
Sundara summarises the evidence as follows :

"From the present meagre evidences from the two cultural levels : the Neolithic and the Megalithic, it appears provisionally that while the people of Australoid and Mediterranean which has been designated as 'Dravidoid' racial types were wide spread in the Deccan and South India at least from the Neolithic times onwards, there was perhaps an intrusion of an alien people represented by brachycephals having affinity with the South-Indian stock known only from the megaliths, who probably introduced the practise of erecting tombs of huge rough stones in the Lower Deccan." He further suggests (Sundara, 1975; p. 191) that "the South Indian megalithism in view of the close resemblance of particularly the passage chambers with those of the Mediterranean and western Europe appears to have diffused from the eastern Mediterranean region and along the coast into the hinterland of South India."

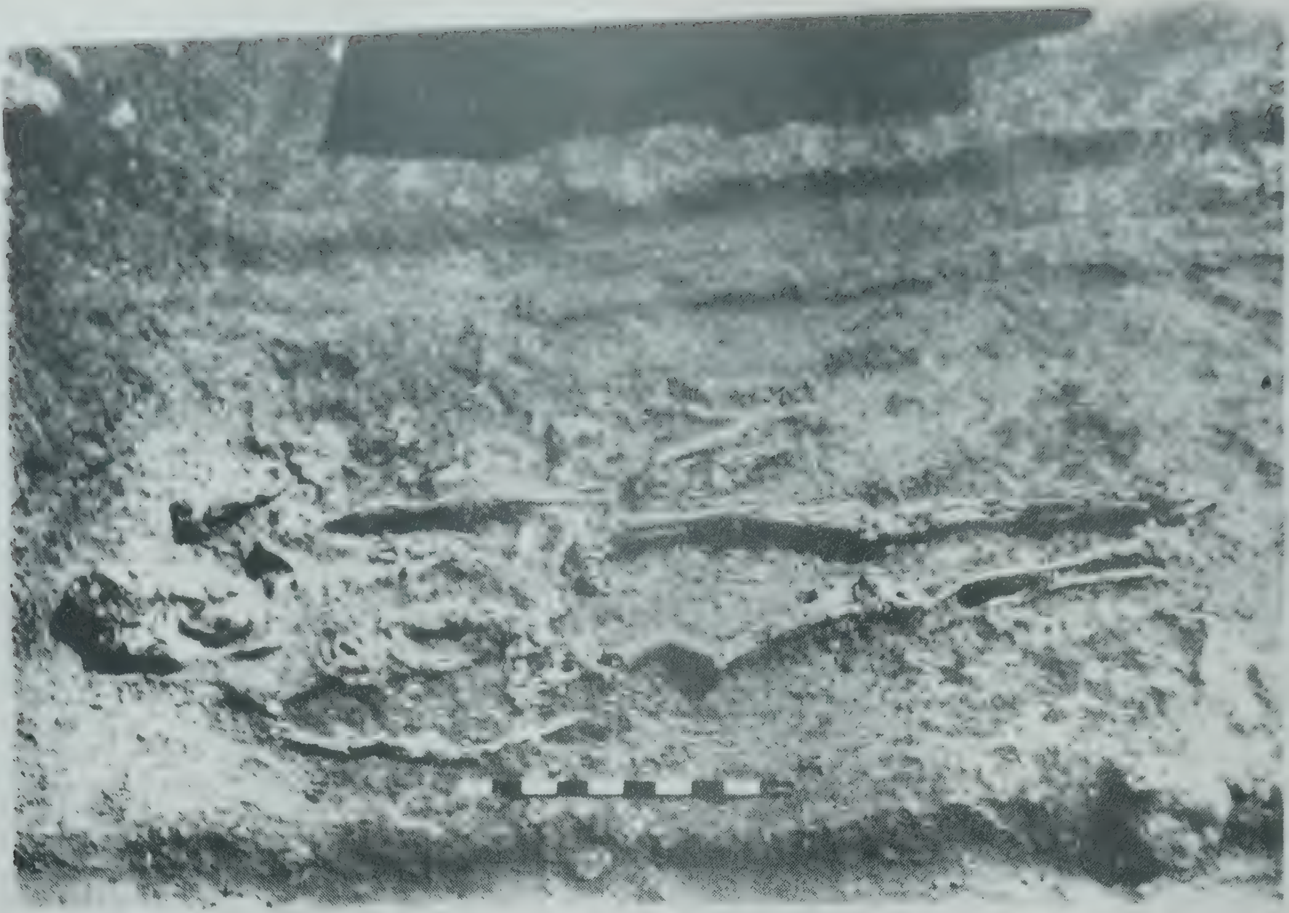
No such observations are possible on the basis of the skeletal data available in Vidarbha, as unfortunately the data available is fragmentary and ill-preserved. However, it is pertinent to point out that the western coast of Maharashtra as also the western and northern regions have hardly given any evidence of the existence of megalithism. As has been stated earlier,



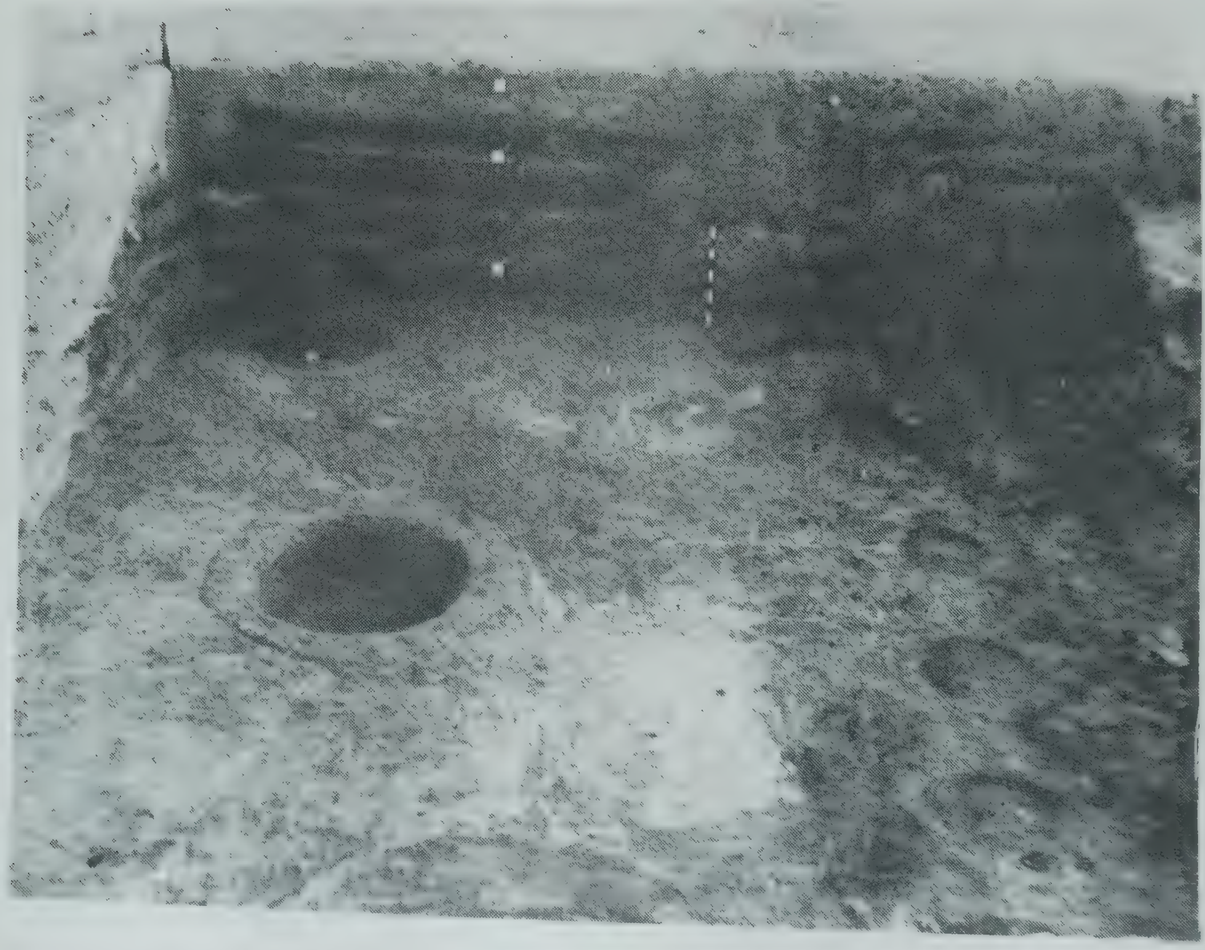
Pl. I A stone circle with a smaller circle in the centre with spenning to the south, Bhagimohari, Maharashtra



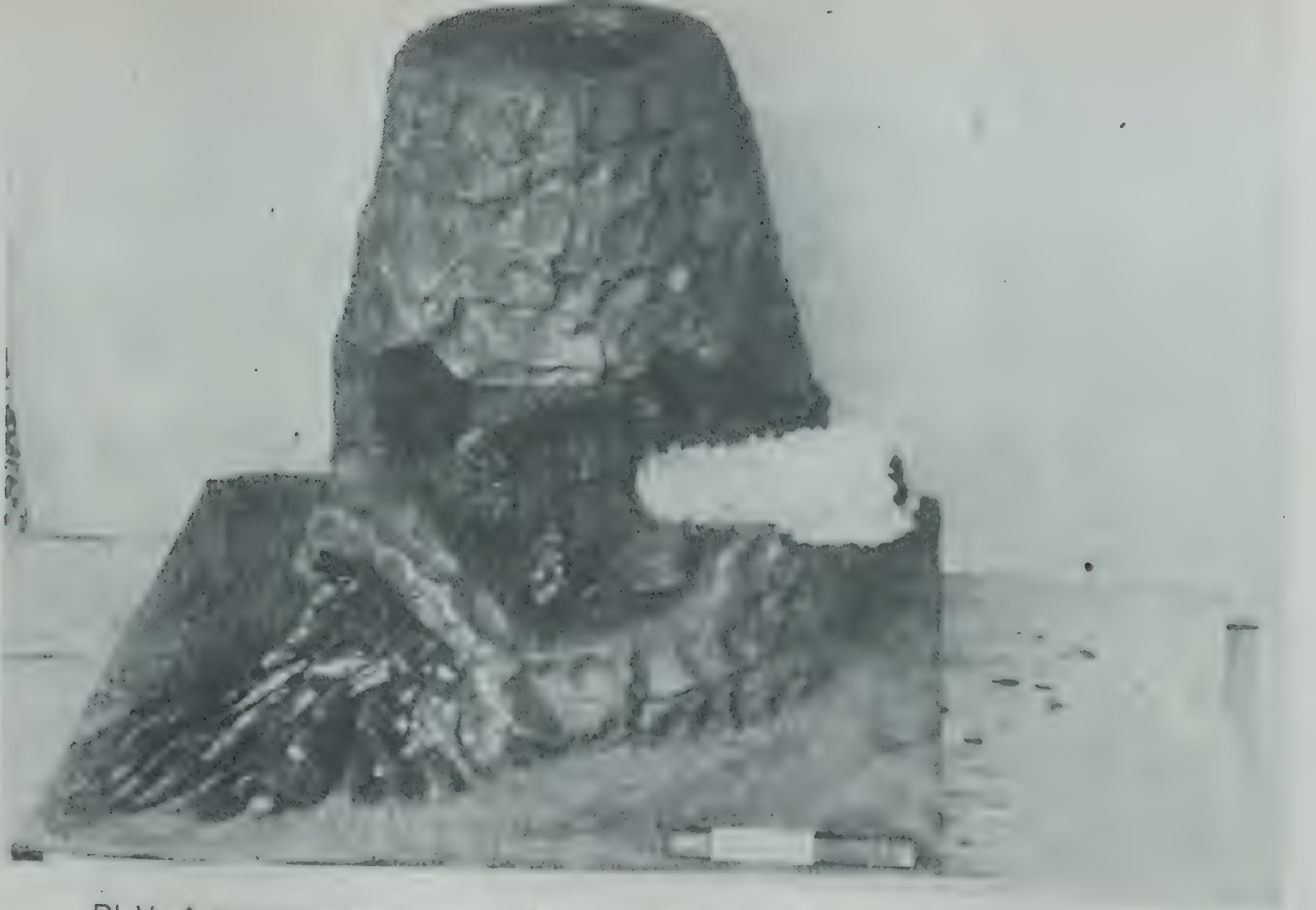
Pl. II A stone circle with double chamber of smaller Pebbles in the centre and a passage to south, Bhagimohari, Maharashtra



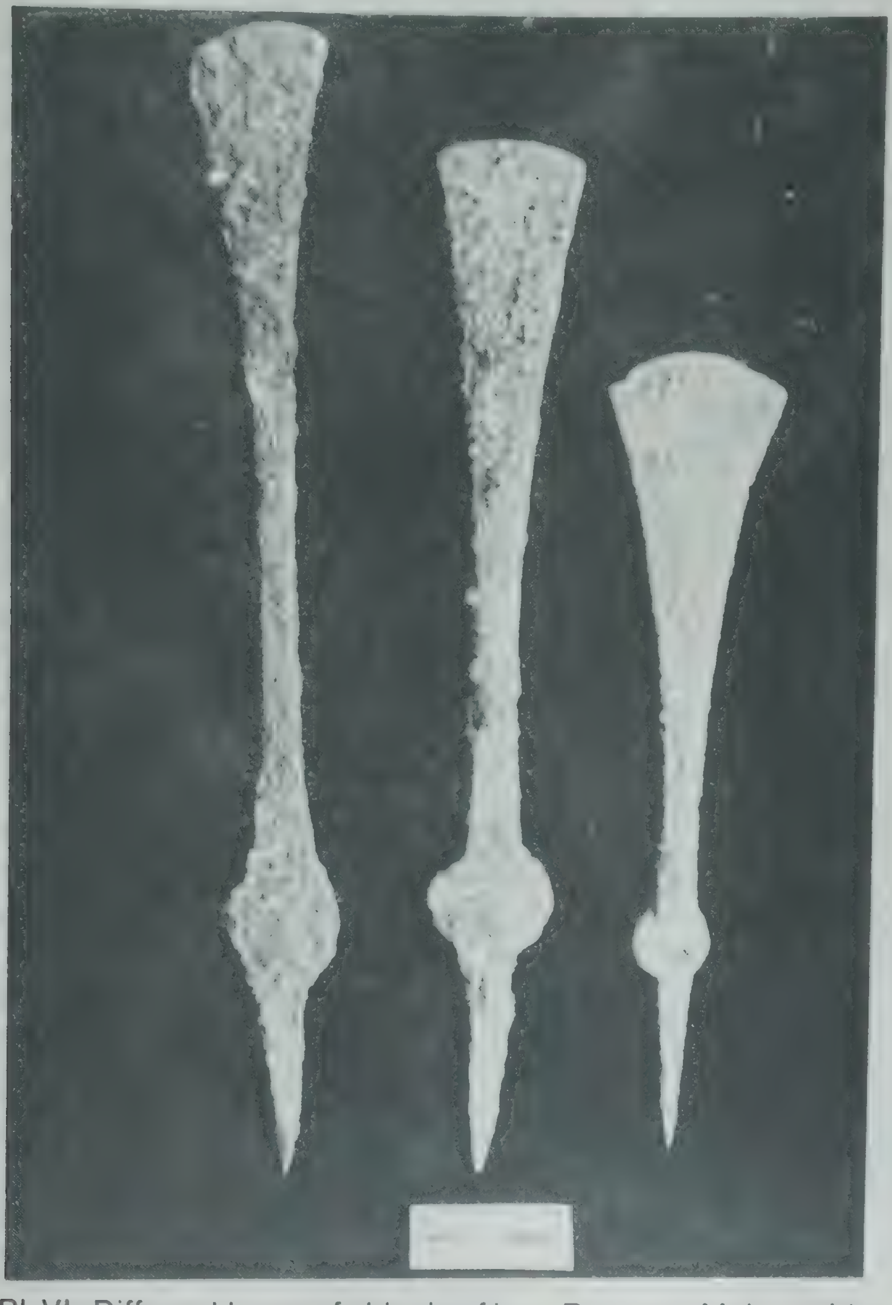
Pl. III Double burial in a stone circle, Mahurjhari, Maharashtra



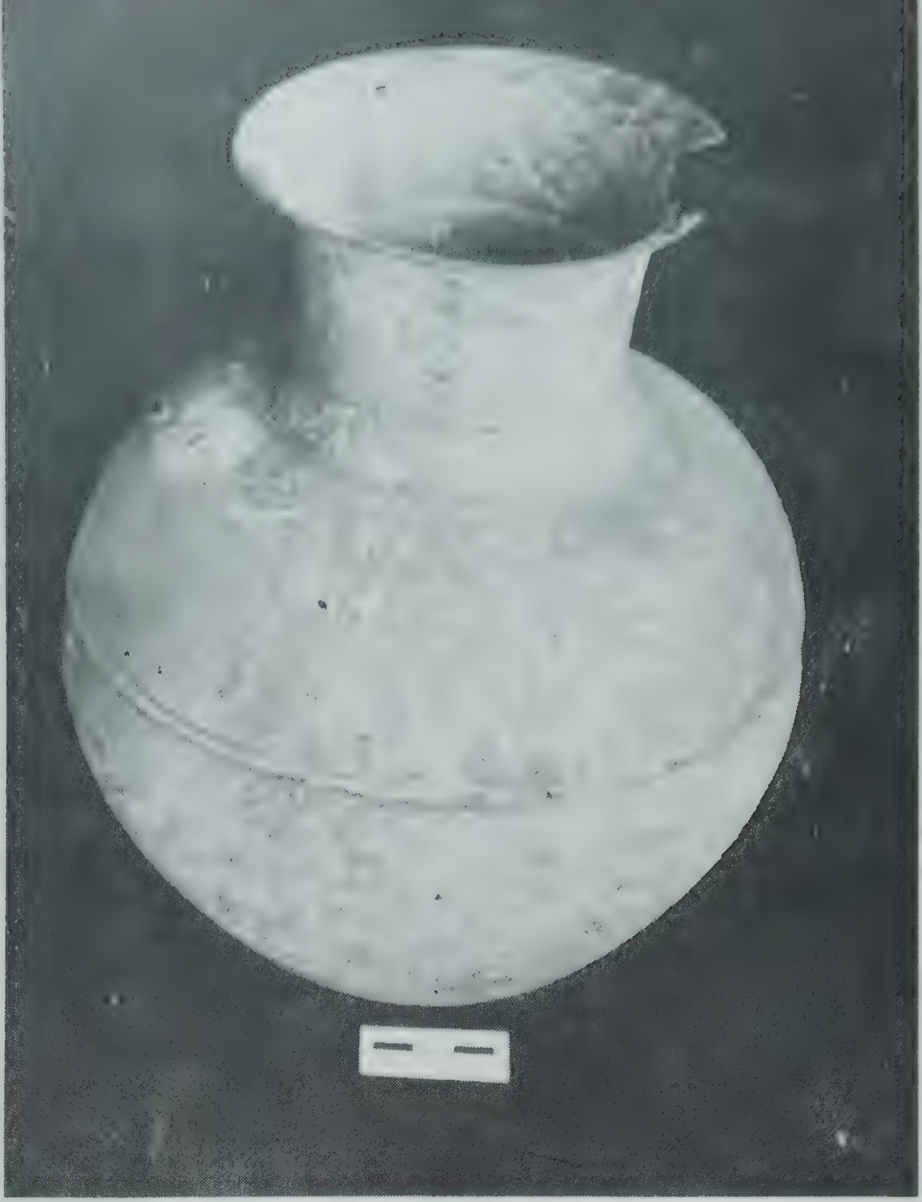
Pl. IV Remains of a megalithic house: postholes, lime plastered floor and circular storage bins, Bhagimohari, Maharashtra



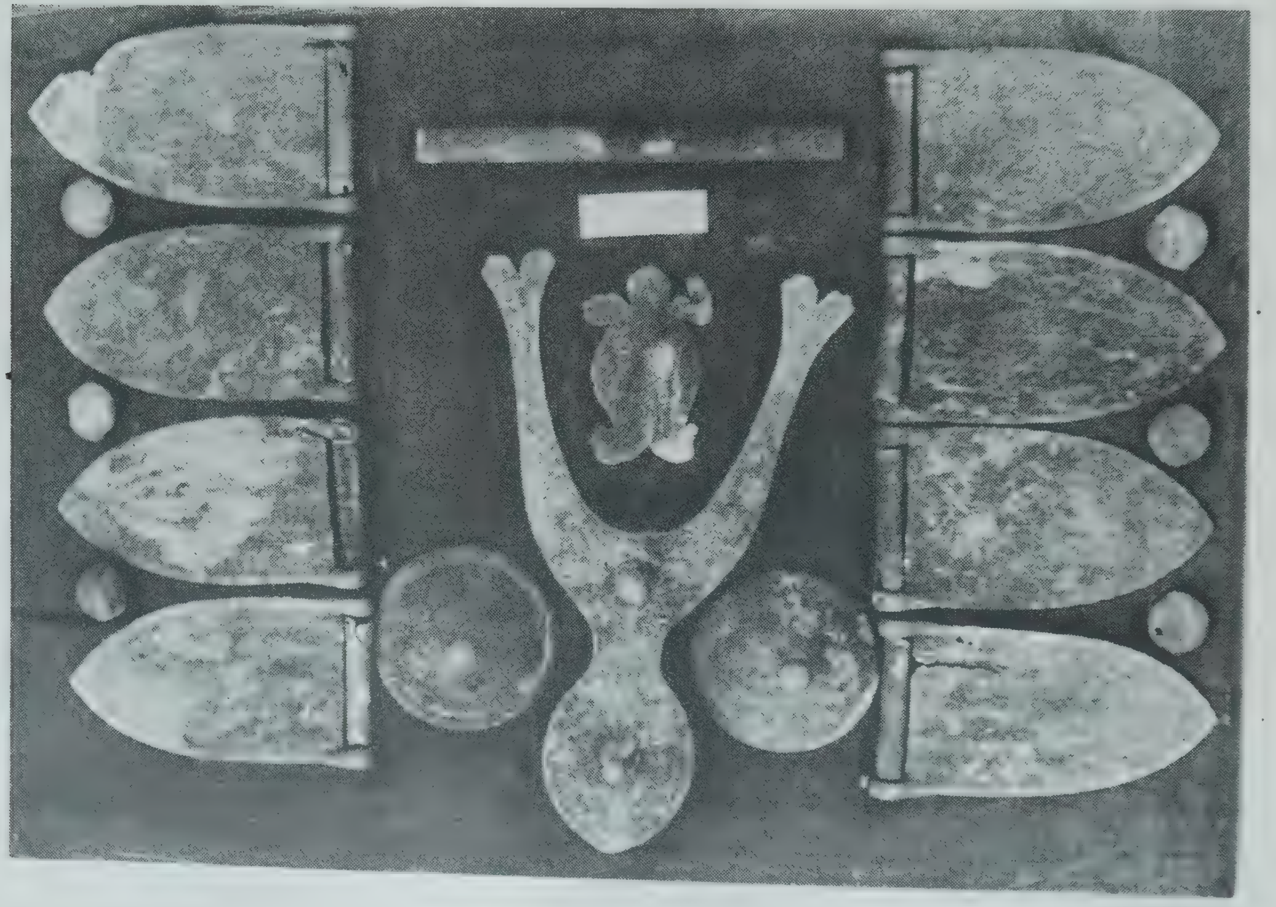
Pl. V A reconstructed model of an iron-smelting furnance, Naikund, Maharashtra



Pl. VI Different types of chisels of iron, Borgaon, Maharashtra



Pl. VII A copper pot with three parts rivetted with iron pins, Mahurjhari, Maharashtra



Pl. VIII Horse ornaments of copper sheets, Raipur, Maharashtra these are concentrated only in Vidarbha and to some extent in southern Marathwada. regions which are contiguous to Andhra and Karnataka.

The Dating

Finally, the dating of Megaliths in Maharashtra and Karnataka presents some problems which cannot be ignored.

The main plank of dating the megaliths in Karnataka are the C_{14} dates from Hallur which come from the horizon of overlap between the Neolithic and the Megalithic. These are, as is well-known 1015 and 955 B.C. The C_{14} dates from the megalithic from Halingali (Sundara, 1975; p. 215) do not help as they are off the mark so far as antiquity of megalithism is concerned. Therefore on relative dating based on comparative data, Sundara brackets the megalithic various types in north Karnataka between 1200 to 100 B.C., the earliest being the passage chamber group of Konnur type and thelatest that of portholed chambers, pit circle etc. assigned to 800–100 B.C., but in some cases continuing upto the 2nd/3rd Cent. A.D.

The dating of megaliths in Maharashtra is more secure on two counts :

a) evidence of contact between end-Jorwe and megalithism.
b) a series of C_{14} dates from megalithic cemeteries and habitational deposits.

Both these, as stated earlier, (Deo, & Jamkhedkar, 1982; pp. 7-8) conform well and range around 8th–7th Cent. B. C. It may also be stated here that some of the C_{14} dates atound seventh century B. C. come not from the earliest occupational horizons but from layers somewhat subsequent to that implying that the antiquity of megaliths in Maharashtra may be pushed back by a century or two, coinciding with the existence of Late Jorwe phase in western Maharashtra, C. 1000–700 B.C.

IV

Resume

The foregoing survey of the megaliths in Maharashtra and Karnataka brings out the following features :

1) In Maharashtra, the concentration of megaliths is mostly in Vidarbha, whereas in Karnataka they are spread in various regions ;
2) The stone circles with cairn filling is the dominant type in Maharashtra, whereas in Karnataka there is a wider typological variety;
3) The amount of iron and copper objects in Maharashtra megaliths far outnumbers that in Karnataka megaliths;
4) There is direct evidence of agriculture in Vidarbha; not much evidence is available in Karnataka;
5) There is evidence of horse sacrifice associated with megalithic burials in Vidarbha. No such evidence is available in Karnataka so far;
6) There is direct evidence of iron smelting in Vidarbha megalithic habitations. No such evidence has yet been available in Karnataka;
7) The C_{14} dating in Vidarbha has been uniform from a number of sites, whereas that is not the case in Karnataka.
8) No deductions are possible regarding the megalithic population components in Vidarbha, and
9) The Scytho-Iranian element in Karnataka megaliths has to be viewed in the light of the horse trappings recovered in Vidarbha megaliths which have Central Asian parallels.

21. VIDARBHA MEGALITHS AND ANDHRA, KARNATAKA : CONTACTS AND CORRELATION

K. P. Rao

The Vidarbha megaliths show some peculiar characteristics, somewhat distinct from the megalithic burials of other regions of south India. The excavated burials in Vidarbha have shown that the pit burials is the only type prevalent in this region. Considering the outward appendages, stone circles with cairn packing is the only visible indication showing the presence of the burials. Cists, dolmens, menhirs and sarcophagi are almost absent in this part of the country. The interment of the skeletal remains of the horse, horse ornaments, copper utensils and copper bangles with herring-bone design, and the presence of cup-marks are the other features which are more prominent in the Vidarbha region.

Having observed the basic features of Vidarbha megaliths, let us have a look at the evidence from north Karnataka, the megaliths of which region are considered as the earliest ones in the Indian sub-continent. The main types occurring in this region are passage chambers, round and long barrows, stone circles, dolmenoid cists, pit burials, oblong cists, urn burials, etc. The date assigned by Sundara to the megalithic culture in north Karnataka ranges between 1200 B.C. and 600 B.C. in general (Sundara, 1975; p. 215), whereas in Andhra Pradesh and Maharashtra the evidence speaks in favour of late chronological assignments. The megaliths of Vidarbha region are dated roughly between 800 B.C. and 400 B.C. (IAR, 1978-79; p. 105; Deo, and Jamkhedkar, 1982, p. 7; Deo, 1970; p. 13; Rao, 1983 pp. 199-211) and that of Andhra Pradesh between 600 B.C. and early centuries of the Christian era (Sarkar, 1979-80; p. 53; IAR 1978-79, p. 104; Rao, 1983; pp. 199-211).

Thus it is clear that the megalithic culture in Vidarbha and Andhra Pradesh shows a later beginning than in north Karnataka. This would naturally lead us to think that the megalithic culture of north Karnataka has lent impetus to the megalithic culture in Vidarbha and Andhra Pradesh regions, which form the adjoining regions of north Karnataka. Whereas, with regard to Andhra Pradesh this theory seems to work well, one may have to be more cautious in connection with the megaliths from Vidarbha region.

Most of the burials of north Karnataka show enclosure character (i.e., cists, chambers, etc.), whereas the Vidarbha megaliths are simple pit-burials. If the Vidarbha megaliths were developed from the Karnataka megaliths, then why the Vidarbha megalithic people did not adopt the enclosure character ? Is it because of the geomorphological reasons ? Of course, geological conditions must have played considerable role in determining the burial structure, but the reason for the difference in the burial structure between the north Karnataka megaliths and the Vidarbha seems to be different.

The burial interments of the Vidarbha megaliths also show considerable difference with those from the north Karnataka megaliths. Whereas, pottery, copper and iron goods are relatively scarce in north Karnataka megaliths, these goods are found abundantly in the Vidarbha megaliths. The iron implements from the earlier region do not show any similarity with those from the later region. Even the shape of pottery also show very little resemblance. Skeletal remains of horse and horse equipment is almost absent in north Karnataka, whereas these interments are abundant in the Vidarbha megaliths. Apart from all this, the presence of cup-marks on Vidarbha megaliths is another characteristic aspect speaking in favour of an independent origin with inspiration from a different source than the north Karnataka megalithic tradition. Thus, though the north Karnataka megaliths can be considered as of early origin and responsible for the development of the numerous types in other regions of south India, they cannot be accepted as the 'inspiratcrs' of the monuments in Vidarbha region.

The considerable difference in burial construction and interments of these two regions speak that these regions have received megalithic impetus from different places and probably in different times. Earlier also scholars have expressed that the Indian megaliths have arrived from more than one source (Soundar Rajan, 1969; p. 80; 1980, pp. 111 and 144; Haimendorf, 1945; pp. 83-84). In that case for Vidarbha megaliths one has to look for a region other than the Mediterranean region, which is believed to have lent inspiration for a major variety of megalithic monuments in India.

It appears that one has to look upon Western Europe, especially Britain and Ireland, as the place of origin for the Vidarbha megaliths. Most convincing evidence is provided, probably, by the characteristic cup-marks found on the megaliths of both these regions (Rivett-Carnac, 1870; p. 57; 1879; p. 14) Much similarity is also observed in the construction of the burial monuments and even in the funerary assemblage. While comparing monuments of Vidarbha region with those of Ireland, Rivett-Carnac says "...., it will be seen, that to nearly every single implement or ornament found in India, an exact counter part can be traced among the specimens dug out of similar tumile in Ireland" (Rivett-Carnac 1879, p. 12). Such resemblance was observed even in a trifle matter like 'herring-bone' design found on the copper bangles.

Taking into consideration the evidence discussed above, it is justified in seeking western Europe as the region which has lent impetus to the megaliths of Vidarbha region. It is needless to say here that, a concerted effort keeping these points in mind would yield better results and would help in pin-pointing the original source of the Vidarbha megaliths.

Having thus observed that the north Karnataka megaliths and the Vidarbha megaliths have not received the impetus from a common source and that the north Karnataka megaliths, though earlier than their counterparts in the Vidarbha region, do not show any influence on the later, we may now briefly survey the propogation aspects of the culture from both these regions and their fusion region.

The evidence shows that the Karnataka megaliths and Vidarbha megaliths were introduced via the west coast of Indian Peninsula. Here, let us not go into the controversial issue-whether the megalithism arrived by sea route or by land route. The Karnataka megaliths, having introduced in the west coast, propogated eastwards (apart from other directions) and probably responsible for many types in Andhra Pradesh. On the other hand people responsible for Vidarbha megaliths, having arrived on the west coast, migrated eastwards, probably because of the presence of Chalcolithic culture as evidenced at Jorwe, Navadatoli, Nevasa, etc. It is also important to note in this connection that all the excavated sites in Vidarbha reveal that these sites were occupied for the first time by the megalithic people (Dikshit, 1968; pp. 27-28; Deo, 1970; p. 12; Deo, and Jamkhedkar, 1982; p. 7), thus implying that these people did not have had to contend with the Chalcolithic people in this region. Even if there were some chalcolithic settlements in this region, they were probably sporadic and enough area was there for the megalithic people to establish their habitations.

After reaching the Vidarbha regionthe megalithic tradition of these people propogated in different directions especially southwards into Andhra Pradesh. In the northern districts of Andhra Pradesh (Adilabad, Khammam, Karimnagar and Warangal) these megalithic people of Vidarbha affiliation had probably, come into contact with the people professing the same trait in different manner, i.e., building of stone Chambers. Pochampad (IAR, 1963-64; p. 1; IAR, 1964-65; p. 1;IAR, 1966-67; p. 1) in Adilabad district and Kadambapur (IAR 1974-75; pp. 3-4) in Karimnagar district have revealed both pit and cist burials and attested the Vidarbha connection by revealing copper hilted iron daggers. Also important is the find horse skeleton in one of the burials at Pochampad. Thus this evidence may prove that this region has received the megalithic cultural trait from Karnataka either directly or indirectly, as revealed by the cist burials, and also from the Vidarbha region, as revealed by the presence of Pit-burials, skeleton of horse and copper-hilted iron daggers.

Such intermingling of Karnataka and Vidarbha megalithic trait is, probably, more clear in the Trimmed stone circles of Khammam and Warangal districts. Here we notice trimmed stone blocks arranged in perfect circle resembling the construction of the passage chambers of the Konnur type (Sundara, 1975; Pl. II, 2). The stone circle of Khammam and Warangal districts usually enclose dolmenoid cists with port-hole and passage. The port-hole is squarish and resemble the ones from Rajan Kolur (Sundara, 1975; Pl. XV, 1) in Karnataka. Numerous anthropomorphic figures in different shapes were found in Khammam and Warangal districts (King, William, 1877; pp. 180-181; W., 1878; p. 234; Rao, 1983, Pl. 15, 16). One such rude anthropomorphic figure was also found at Rajankolur (Sundara, 1975; Pl. XIV, 4). Thus it appears that the megalithic builders of Khammam and Warrangal districts have received the constructional traits from Karnataka region. Excavation of the trimmed stone circles at Janampet in Warangal district have yielded, apart from other things, horse bits in Iron (Ahmad, Khwaja Mahammad, p. 3; Ramachandran, 1960, pp. 170-172) revealing the traits of Vidarbha megaliths. All this evidence shows that the northern districts of Andhra Pradesh present the fusion point between the Karnataka and Vidarbha megalithic traits.

Thus from the above discussion it follows that the megaliths of North Karnataka and the Vidarbha regions have received the megalithic dint from different regions, and that the northern districts of Andhra Pradesh form the fusion point of both these traits.

22. THE MEGALITHIC GRAVES OF THE SRISAILAM SUBMERSIBLE AREA

B. R. Subrahmanyam & J. Suryanarayana Raju

The recent salvage operations in the Srisailam project area in Andhra Pradesh are an illustrious example of collective effort in archaeological investigations. Several institutions and individuals joined hands to discover and conserve archaeological wealth of first rate importance, threatened with submersion in the lake waters of the Srisailam dam across the Krishna river.

Noteworthy among the discoveries are extensive groups of Megalithic burials at Gondimalla, Chagatur and Peddamarur, the three localities all situated in close neighbourhood of one another. Further, the excavations at Peddamarur and Virapuram revealed occupation deposits of Megalithic culture. The occurrence of burials as well as occupation deposits point out that Megalithic culture must have been prevalent in the region. But as no detailed excavation reports are available except for Virapuram, it is rather difficult to time-bracket the Megalithic culture in the region. Three C_{14} dates available from Virapuram however, range from 284 ± 90 B.C. to 110 ± 110 B.C. The dates apart, the excavated evidence from both the habitation sites points to overlap of the Megalithic Culture with the succeeding Early historic whereas there does not exist such a contact with a preceeding culture. At Peddamarur, the habitation begins with Megalithic Culture and at Virapuram a prominent sterile layer separates the Megalithic from the Chalcolithic. Pending a further consideration of these facts, we now turn to the types of grave goods.

At Peddamarur, Megalithic graves occur at two localities, 5 kms apart and respectively to the North and South-East of the village. At locality 1, there are 6 preserved graves, all passage chambers with port-holes enclosed by dry stone masonry walling and the whole encircled by vertically planted slabs. At the other locality, the burials are of different types. In a total of 38 extant ones, there are 15 uni-chambered cists, 20 compartmented cists and 3 pit circles. A uni-chambered cist excavated at the place is in the form of an oblong Svastika (2.30 x 1.85 m), entered through 1.30 x 1.05m passage on the south which leads to a 44cms wide port-hole cut into the southern orthostat. The burial contains as many as 9 skulls, together with long bones, including one set of them placed in the oblong passage.

Two compartmented cists opened up at the site, are also passage graves, the passages facing south in both the cases. One of them a transepted cist has a 44 cm wide port-hole in the southern orthostat. The eastern compartment has a legged sarcophagus containing a few human bones. Outside of the sarcophagus there are four fragmentary skulls besides many long bones. The western compartment has two fusiform sarcophagi each containing fragmentary skulls and bone pieces, some of which are charred. The other excavated compartmented cist was a three chambered one with two partition slabs inside, which are pierced with port-holes for purposes of inter-communication. Two of the chambers respectively contained urns and a sarcophagus all with human bones inside; the third one has a number of bones but no urn or sarcophagus.

A fourth burial excavated at the site was a pit with passage on the south, the whole enclosed by a double circle of stones. There were skeletal parts including a skull inside the pit.

The funerary goods inside the burials comprise varied number of pots of black, black and red, red and coarse red wares and different types of iron objects such as arrow heads, knives, sickles, bill-hooks, rings, nails, chisels etc., though the list is no means complete.

At Chagatur again there are a number of port-holed cists with passages provided on the south. One of these with impressive dimensions measuring 30 mts across is a quadrated cist with a dry stone walling around, the whole enclosed by a circle of dressed stones. Two port-holes, one below the other cut into the southern orthostat open out into the passage lined by stone slabs. Some of the interesting features of this grave are: two stone benches which may have been used for exposing the dead bodies, huge stones vertically planted one each at the cardinal points and a sketch showing the worship of the Padas. This Megalith has the air of a chieftains' burial monument.

Another site where Megaliths occur over an extensive area is Gondimalla. Both cist and pit burials are discovered here, but occurring as discrete clusters. These principal types are divisible on the basis of whether or not they are passage graves and the direction of the passage if present. Some of the pit-circles have capstones, whereas others do not have them. Among the cists both uni-chambered and compartmented ones are present. Usually cists have the longer axis oriented to north-south and passages where present face the south. But an aberrant type has passage towards east. The pit burials are usually oriented east-west unlike the cists; but north-south oriented pits are not absent. Such of the pits that have appended passages, show them either on the east or on the south depending on the direction of the longer axis of the burial pits. It is observed that at Gondimalla, the pit burials have richer funerary furnishings than the cists. The funerary goods as at other sites comprise pots of black, black-and-red and red wares and iron objects such as chisels, knives, daggers, javelines, arrowheads, axe blades and horse bits. One of the burials, a cist with passage to the south, yielded even early historic pottery.

From the above factual data gathered from excavation as well as surface indications, it is evident that there are different types of Megalithic monuments in the Srisailam dam submersible area. These are :

1. Unichambered passage cist
2. Compartmented passage cist
3. Compartmented passage cist with urn sarcophagi
4. Porthole cist
5. Passage pit with or without cap-stone.
6. Pit without passage and with or without capstone.

These types are also known to occur in different parts of South India. Chamber tombs with passages have been reported from Konnur and Aihole in Karnataka and Irlabanda, Mudigallu and Gajjelakonda in Andhra Pradesh, to mention a few instances, Port-hole cists and pit burials are quite well known types. Cists with urns and sarcphagi occur at Virajpet, Murybetta, Chandravalli in Karnataka and Irlabanda, Koyalgunta, Gajjelakonda in Andhra Pradesh. Thus we have from other parts of South-India, parallels for the grave types available in Srisailam area.

The graves, whether cists or pits, contained human skeletal parts, including skulls and long bones. Often they contained mortal temains of more than one individual, thereby indicating that they were not individual, but multiple burials. The passages and port-holes, certainly were intended to provide repeated entry into the graves, as and when occasion demanded. The occurrence of 'macerating' platforms and improvised stone benches, at the sites under consideration, points to post excarnation as the burial mode. The same is indicated by the indiscriminate grouping of skulls and bones inside the monuments.

Assuming that the funerary practices of the Megalithic builders involved repeated opening of the graves to deposit the mortal remains of different individuals, at different times, we may consider that the cists and pits with passages were the two arch types. In case of copmartmented cists and port-hole cists, we observe structural alterations of the original model. But the structural alternations did not involve changes in mortuary practices, to the extent that they were still multiple burials and could be reopened for fresh internments at will.

But on the other hand, the introduction of urns and sarcophagi inside the chamber tombs constitutes deviation from the normal Megalithic practice. We find here the association of a new element which may not have been originally part of the Megalithic tradition.

The pit burials without passages, unlike the others, are an enigmatic type. They can not be reopened when once sealed and covered by cairns, without causing structural damage to the graves. The contents, whatever be, must all have been deposited inside, before the grave was finally sealed. At the best, the pit circles without passages may be regarded as collective burials, not meant to be reopened afterwards. We observe here a funeral practice, not strictly conforming to the Megalithic tradition. But as these graves occur along with the passaged pits in one localized group and consists of much the same sort of grave goods as the others do, there is no denying the fact that they were megalithic burials.

It is not clear, whether the cists and pits belonged to different sections of megalithic population. The discrete grouping of these types of monuments in the cemeteries would certainly favour consideration in terms of two sections of the people adopting different forms of graves for disposing off their dead. But these differences cannot be given projection of ethnic differences in the population. Even if they had represented different ethnic groups at the beginning, the differences would have been unrecognizable in the daily pursuits of the people at the time under instance, in view of the fact that the burial offerings were the same irrespective of the grave types.

Extended inhumation in pits for adults and urn burials for children were an old practice of the Neolithic times in South-India. In Jorwe culture of south Maharashtra, double-urn burial for children was the normal practice, whereas there were occasional examples of the usage of multiple urns, as many as five, from Inamgaon, Nevasa and Diamabad. Two of the adult burials of the Jorwe period from Inamgaon are of an interesting kind. In both the cases, the urns were legged and shaped as human effigies. One of the two, however, had two conjoined legged urns, which may be recognized as incipient form of sarcophagus. Thus pit burial, with or without urns, was the prevailing funerary practice in South India from atleast the middle of the second millennium B.C. But these were individual and complete inhumations, contrary to the predominant Megalithic practice of muliiple and post-excarnation burial.

India had no tradition of building chamber tombs for the dead and the practice, without doubt, had its origin elsewhere. Sundara traces the origin of the cist chambers in South India to a Mediterranean source. Soon the practice of erecting cist chambers gained local acceptance in South India, where there had been a tradition of burying the dead, unlike in North India. There are examples available to serve as pointers to the gaining hold of the new tradition on the autochthonous populations. At Ittigabailu and Chandravalli in Karnataka and Jaggaiahpeta, Yeleswaram, Lingala, Janampet, Narkaitpalli and Devarakonda, all in Andhra Pradesh, cist chambers contained complete or articulated inhumations. Passage cists with sarcophagi are available at Irlabanda, Koilgunta and Gajjelkonda in Andhra Pradesh. Cists with legged urns are known from Chandravalli, Murybetta and Virajpet in Karnataka and Mudigallu and Gajjelakonda in Andhra Pradesh. These examples point out the way in which the old and pre existing traditions were getting absorbed into the Megalithic.

Just as some of the sections of the local population took up the new tradition of erecting chamber graves for their dead, others stuck to the old and time-honoured practices, as known from examples of pits with extended inhumation at Maski in Karnataka and at Nagarjunakonda and Yeleswaram in Andhra Pradesh. The grave offerings in these pits including iron objects and black-and-red ware underscore the fact that they were of the Megalithic time.

Compulsion. conviction and fancy may have all contributed to variation in sepulchral architecture of the megalithic times. It is one thing to point out the morphological changes in the graves and the fusion of different traditional elements; but we have no clear idea of how the change took place from the primary and individual to the secondary and multiple mode of burial.

There are different types of megalithic graves in the Srisailam submersible area. It appears that these came into being at different points in a wide time bracket. The exclusive cluster of passage cists at Peddamarur, locality 1, probably sounds the onset of megalithic tombs building tradition in the region. The compartmented cists of Peddamarur locality 2 which contain legged urns and sarcophagi indicate a fresh wave of megalithic builders from regions to the west or north-west which had passed through Jorwe influence. The pit burials of Gondimalla also must be traced to the same source region. But the exclusive clustering of the cist and pit graves in the cemeteries indicates consciousness of the traditional differences of the social groups and must refer to a point of time when the Neolithic tradition of pit burial was still strong and firm. In view of these, one has to doubt the relevance of the Carbon - 14 dates of 3rd-1st century B. C. from Virapuram, for the burials from Peddamarur and Gondimalla. The burials should belong to far older dates. At any rate, it must be pointed out that the megalithic tradition was already an established fact in certain parts of South India, by the time it entered into the Srisailam area. Megalithic graves continued to be erected down to early historic times as indicated by the pottery recovered from one of the burials.

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23. MEGALITHS OF VARANASI – ALLAHABAD REGION AND KARNATAKA – SOME ASPECTS

P. Singh

As desired by the organisers of the Centenary Celebrations of the Karnataka State Department of Archaeology and Museums, an attempt has been made in this paper to make a comparative study of the megalithic remains of the hilly tracts of south–eastern Uttar Pradesh with those of Karnataka. At the face it this attempt may look futile as the two zones are separated by a distance of more than one thousand kilometres intervened by natural barriers like hilly ranges and mighty rivers. However, there is some justification for such an attempt. Firstly, recent studies have shown that some megaliths of both regions belong to a Chalcolithic milieu and their dating may be earliest as compared to that of Tamilnadu, Andhra Pradesh, Kerala and Vidarbha. Secondly, there has been a general belief among a section of scholars that the idea of megalith-building travelled across the sea through Arabia (Gordon) and the megaliths around Karachi represent the springboard for the transmission of such ideas (wheeler). If such assumptions have any validity, the importance of megalithic remains in the Vindhyas is obvious because of their geographical location. Our study is based on the published data and it is divided into six heads, e.g. Distribution, Structural similarity, Burial ritual, Funerary offerings, Chronology, and Conclusion.

Distribution

In Karnataka, megaliths are distributed in the districts of Bidar, Gulbarga, Bijapur and Belgaum in the north; Dharwad, Raichur and Bellary regions in the centre and Hassan - Bangalore and Kolar in the south. Further south, these are reported from Coorg, Virajendrapet and Sultan's Battery areas on the borders of Tamilnadu and Kerala. Besides, they occur in the Chitradurg district located in the central part of the state which connects these with central and southern group. Megalithic graves seem to be absent in the western parts and the sea-coast regions of this state, due perhaps to inadequate exploration.

Our knowledge regarding megaliths of each zone is not uniform as planned regional survey followed by excavation of selected types of megaliths and the habitation sites associated with them still remains to be attempted.

In the northern region the megaliths of Bijapur and Belgaum are partially understood because of excavations at Halingali and Terdal in the former district (Sundara 1969-70; pp, 23-33) and that of Hunur in the latter district (Rao, IAR 1968-69). The cist circles and stone circles of Chitradurg were excavated by Wheeler (1948; pp. 181-308) which became a trend-setter for such investigations followed by the excavations at Maski (Thapar, 1957; pp. 4-142) in Raichur district. Among the megalithic remains of the southern region the cairn circles of Jadiganahalli in district Bangalore (IAR-1956-57; p. 34) opened by Prof. Seshadri provided interesting details regarding sarcophagi burials in pits.

Besides these five sites noted above, some interesting data has been obtained in recent years by re-newed excavations at Chandravalli by the Archaeological Survey of India

(IAR 1977-78; pp. 26-27) which has largely confirmed the findings of Brahmagiri. Here a disturbed cist burial with cairn packing and a stone circle were excavated. It yielded characteristic pottery, a few Satavahana coins and funerary offerings like terracotta beads but no skeletal remains. The excavations of four cairn circles containing urn burials at Tadakanahalli in district Dharwad (Nagaraja Rao, 1985; p. 470; IAR, 1978-79; pp. 44-46) has indicated their contemporaniety with the overlap phase between the Chalcolithic and early Iron age periods dated to C 1000 B.C. at Hallur. This is an important evidence in determining the Chronology of megaliths in this region. Further, the excavation of pit burials with cairn circles at Komaranahalli located about 12 km. to the east of Hallur in district Chitradurga (IAR, 1980-81; p. 29) provides confirmatory evidence obtained from Hallur and Tadakanahalli. White painted conical lids which are found at Hallur in the Chalcolithic Iron age overlap phase (C 1000 B.C.) have been obtained from this site.

Alongwith this recently obtained data, interesting evidence regarding the megaliths of Karnataka is available from the writings of antiquaries and ameteur archaeologists like Meadows Taylor (1849; pp. 170-196); 1873; pp. 329-362), R. A. Cole (1868; pp. 151-155), Mackenzie (1873; pp. 7-11), James Burgess (1874; pp. 306-308), Branfill (1881), J. Coggin-Brown (1917; pp. 7-8), Hunt (1916; pp. 180-224). Cammiade (1930; pp. 187-189) and Munn (1935; pp. 225-250) etc., to name only a few.

The Megalithic remains of the Vindhyas are geographically located in four regions (Singh, 1985; p. 473) :

1) In the Karmanasa-Chandraprabha rivers system in the Chakia sub-division of Varanasi district.
2) In the Chunar-Ahraura region in the northern part of Mirzapur district. Geographically, it is an extension of the first group.
3) Those near the Chachai falls on the Rewa-Chachai fall road-the type site being Kotia.
4) Recently the extension of Kotia group of megaliths have been traced at several sites in the Banda district of U. P. and the Satna district of Madhya Pradesh (IAR, 1975-76; p. 44) and in the Adwa valley in district Mirzapur.

The recent excavation of cairn circles and cists at Amahata and megaliths and the associated habitation site at Munhai on the left bank of river Adwa, both in the Rewa district of Madhya Pradesh (IAR, 1980-81; p. 38) by G. R. Sharma has yielded interesting data regarding their origin in this region. The exploration around Manikpur in district Banda has brought to light megaliths at the slope of hills. A random opening of two from each site of Bagdara and Sarhat yielded remains of pit burials covered over by low cairn. The pits contained Red ware pottery and extremely decomposed pieces of bones (IAR 1980-81; p. 70).

Structural Similarity

As pointed out elsewhere (Singh, 1985; p. 474), the megaliths of the Vindhyas present a rather monotonous picture so far as their typology is concerned. Circular cairns covering grave pits, sometimes lined with stones and a few slab-cists have been reported from this region. In all the groups the structures are essentially cairns with or without chambers and bounding circles of stones. Besides, dolmenoid cists have been reported from Banda (IAR, 1975-76; p. 44) and this type also occurs along with cairn circles in Rewa district (IAR, 1980-81; p. 38) and Mirzapur (IAR, 1979-80; p. 80). Misra observes that while cairn circle is found everywhere in the Vindhyas, cist appears to be a common type only in parts of Allahabad and Mirzapur districts and in the Adwa valley (Misra, 1985; p. 94).

In comparison to this the megaliths of Karnataka are rich in typology. The cist circles and pit-circles with post-holes of Brahmagiri and Maski and the recently excavated site of Komaranahalli in district Chitradurga (IAR, 1980-81; p. 29) are too well-known to be repeated here. While cromlechs, kistvaens (dolmens) and cairn-circles are the main types available all over the state, menhirs and stone alignment are a special feature of Raichur doab. The menhirs of Hassan district show a greater variety. Mackenzie (1873, p. 49) had divided them into six categories. He also observed that these menhirs are not always connected with the cult of the dead. Cairn-circles enclosing deep pits containing hand-made sarcophagi occur at Jadigenahalli near Bangalore. Urn-burials seem to be an important feature in the Coorg and Mysore regions. Cammiade (1930; p. 183) had counted as many as 17 urns in an area of 150 square yards at at Sultan's Battery.

The megaliths of North Karnataka has been extensively studied by Sundara (1975; p. 157) who divided them in two broad types : the chamber tombs and the unchambered burials. While passage tombs are the principal type, a few cairn circles have also been reported from this region.

Burial Ritual

The megaliths of the Vindhyan region have yielded traces of what may be called fractional burial. Human bones are rare in this region. Of the 12 excavated graves of the Kakoria complex, only three yielded human bones in limited quantity and in fragmentary condition. From this rudimentary evidence it is difficult to make out whether these represent the remains of post-cremation or post-excarnation burials. In the megaliths of Karnataka and indeed in those of other neighbouring provinces, post-excarnation burial was the principal mode of the disposal of the dead while the practice of extended inhumation, a trait of the preceding Neolithic culture of this region (Singh, 1970) did persist for some time in the succeeding megalithic culture also. The discovery of complete human skeleton in extended articulated condition at Maski may be cited as an example of the latter class. Two complete skeletons laid on each other, both facing downwards, were found in a cairn at Jiwarji. These were male and female, the skeleton of the male being below that of the female (Singh, 1970; p. 105). Besides, the cist type of cairns of Rajan-Kolur in Shorapur principality had yielded complete human skeletons.

Funerary Offerings

Food and drinks placed in pottery vessals were placed in the graves in both regions under study. Similarly, the personal effects like metal tools and weapons, ornaments and objects of everyday utility occur in the graves of the Vindhyas as well as Karnataka. This is a clear indication of the commonness of eschatological beliefs of the megalith-builders of both regions. In addition to this, megaliths of each region have yielded some other finds which may be enumerated as follows :

In the Vindhyan hills, remains of domestic sheep, pig and cattle together with a few bones of tortoise and rodents were found in the megalithic graves of Kotia.

Microlithic tools, copper pieces, glass bangles and iron fragments have been recorded from the habitation site of Munhai on the left bank of the Adwa river in district Rewa (Sharma, 1980-81; p. 38.)

As regards the placement of burial goods, no uniform practice was observed in the megalithic graves of Chandraprabha valley. They are generally placed either near the the corners or on the centre of the pits (Sharma, 1985; p. 478).

In the recently excavated cairn circles of Tadakanahalli (IAR, 1978-79; pp. 45-46) iron arrowheads and adzes have been found. Among other noteworthy finds from the megalithic graves mention may be made of an urn found in a cromlech at Frazerpett (Cole, 1869, p. 57). This urn was full of paddy, the husk of which was in perfect state of preservation whilst the grain itself had completely disappeared.

However, there is one important difference as regards funerary offerings obtained in both regions. The megaliths of the Vindhyas are not particularly rich in the offerings as compared to those in the graves of Karnataka. The megaliths of the central and southern parts of this state are particularly rich in grave-goods.

Chronology

During the last thirty years there has been increasing evidence regarding the high antiquity of megaliths in south India. Indeed, the province under review has provided the earliest date for the megalithic culture and may as well prove to be the epicentre of megalithic culture in south India. Earlier, Wheeler (1948; pp. 181–308) had dated them to the second century B.C. while Thapar and Banerjee put them to C. 400 and 500 B.C. respectively, Seshadri (1956) dated them between sixth century B.C. and the first century A.D. B. K. Gururaja Rao went a step further and put the beginning of this culture around 800 B.C: (1972; p. 326). Since then there have been two important developments. The investigations of Nagaraja Rao at Hallur have put the Neolithic-Megalithic phase around C. 1000 B.C. and the researches of Sundara at Terdal in north Karnataka have put the time-span between C. 1200 B.C. to the third century A.D. Sundara puts the megalithic chamber tombs in three phases which are as follows:

Early phase	—	Konnur type passage chambers —	1200 — 700 B.C
		Kaladgi type	900 — 700 B.C
Middle phase	—	port-holed chambers of Aihole and Rajan Kolur type	800 — 600 B.C.
		Round barrows of the Upper Tungabhadra valley were also constructed during the same time-span.	
Late phase	—	Pit Circles of Brahmagiri region	800 — 100 B.C
		Such monuments continued to be constructed upto second third century A.D. in Karnataka.	

The data obtained from Hallur has received further confirmation by excavations at Tadakanahalli in district Dharwad (IAR, 1978–79; pp. 45–46) and at Komaranahalli in district Chitradurga. At the former site four cairn-circles were opened. Of these, Megs II and III contained urn burials, a feature common to the Neolithic-Chalcolithic cultures of this region

The pottery, iron implements and the two urn burials from megaliths indicate contemporaneity with the overlap phase between the Chalcolithic and early Iron Age dated to C. 1000 B.C. at Hallur. Similarly at Komaranahalli located not far from Hallur, the occurrence of white-painted conical lids has been taken to demonstrate their effinity with similar finds from Hallur from the overlap phase. From the above account it is clear that the megaliths of Karnataka are the earliest in the series in South India and they hold the key in working out genesis of this culture in this part of the country. In a recent study Narasimhaiah (1980) has shown that the Megalithic culture in Tamil Nadu is somewhat later than that in Karnataka, especially the the Dharwad region.

A similar situation obtains in the Vindhyan ranges also. Here the megalithic graves have been put into two chronological time-brackets. While the megaliths of Kotia have been dated to the time bracket 800-300 B.C. on account of the occurrence of a rich variety of iron objects, those of the Kakoria-Jangal Mahal group seem to be pre-iron in age and have been assigned a time-bracket of 1500-1000 B C. The megaliths of the latter group are supposed to have Chalcolithic beginning. Sharma proposes a date somewhere in the mid-second millennium B.C. (or a little earlier) for the Chalcolithic character of the megalithic culture of Chakia (Sharma, 1985; p. 479). This hypothesis is based on a number of radio-carbon dates from the Chalcolithic horizons of Chirand, Koldihwa and Sohogaura, excavated in recent years. Mention may be made here of the recent excavations at Narhan on the left bank of the Ghachara (not far from Sohagaura) where a rich black-and-red ware culture with painting in white, has been obtained (Singh and Lal, 1985; pp. 113-186). Radio-Cardon determinations from this site will throw light on the beginning of this pottery tradition in this part of the country. The iron-age cairns of the Belan Valley (Kotia) have been dated to *Circa* third century B. C. on the basis of a single radio carbon date and it has been argued that the megalithic culture continued to flourish up to that date.

Conclusion

A critical evaluation of the data pertaining to the megalithic cultures of the Vindhyas and Karnataka shows limited resemblance between the two. While the eschatological belief behind the erection of megalithic monuments remains essentially the same, there is vide divergence regarding the types of megalithic constructions and the associated material culture. The simplest type, pits covered over with stone-rubbles making a low cairn, sometimes enclosed within a circle of unhewn boulders is a common feature in both regions but other exquisite types are exclusive to Karnataka alone and are absent in the Vindhyas. The grave-goods also provide a far greater richness in Karnataka megaliths. As pointed out at the outset, the megaliths of both regions seem to have a Chalcolithic beginning as proved by recent work. Indeed, planned and concerted efforts in future will certainly bring out many new facets of the megalithic cultures of the two regions.

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24 THE MEGALITH - NEW TOOL FOR PHENOTYPE IDENTIFICATION OF CULTURE

Thimmareddy and S. Krishna Rao

Researches in megalithic archaeology are numerous over the past one hundred and odd years. Problems relating to the Megaliths are also many. We are afraid to state that none of them is solved satisfactorily so far. Their origin, homogeneity, heterogeneity, authors and different facets of their culture are yet to be explained. The classification of Megaliths and listing of 'grave goods' are certainly necessary to enable to identify distinct features which could be compared or correlated with similar monuments. But a more meaningful exercise to understand the culture of the Megalithic folk has not been made. This is not to belittle the scholars worked on these problems but to mention that such an exercise is not carried in the light of the living mortuary practices.

Breek's emphasis as far back as 1873 (Deo, 1985) on the importance of correlating the mortuary practices of the megalithic period with those living in the Nilgiri Hills did not catch the attention of many archaeologists engaged in this problem. Aiyappan in his Presidential address to Anthropology and Archaeology section of the Indian Science Congress (1945) gave the right direction of emphasizing on the immense help of Anthropology in the determination of changes of burial customs. In the light of Megalithism still practiced by several Indian tribes he opined that different types of moments, even though belong to the same period reflect the cultural diversity. He further stated that since megaliths continue till recently, they could not have been a sudden exotic introduction. The above observation emphasizes the importance of studying the mortuary practices of the people at or around a megalithic site fully, before an attempt to interpret the megaliths and associated material is made. Recent studies by A. K. Ghosh (1965; pp. 13–16), S. N. Rao (Deo, 1985), O. K. Singh (1985) and others are worth-mentioning as of right approach.

Two case studies correlating megalithic and ethnographic observations in north-east coastal Andhra Pradesh are presented in this paper. Two megalithic sites Siddulakonda (longitude 18° 26' and latitude 83° 53') and Pandavulametta (Longitude 18° 27' and Latitude 83° 54'), the former 26 km. North and the latter 28 kms. North-West of Srikakulam town were discovered in the course of exploration.

Siddulakonda :

Siddulakonda, a memorial stone complex, past and present is situated 7 kms. east of the village Jonanki. The village is known to have been inhabited by the sages or Sanyasis and hence Siddulakonda. The Savarapeta, a settlement of Savaras, a scheduled tribe, which is abundoned now existed near the site. The Savarapeta shifted its settlement and split into Sivarampeta, Konchadapeta and Savarapeta. They moved about 4 kms. from the original settlement. Menhirs are found at the foot of the Siddulakonda. Little away South of these, is a memorial stone complex being raised by the present population of Savarapeta. More interesting is the distinction by the villagers of the menhirs of their ancestors from those of the present. The distinguishing features of the menhirs of ancient period are height, association of black and red ware and clear identification made by the villagers. They say these memorial stones were erected by their ancestors, the tradition of which is continued by them.

There are six menhirs found intact while fallen elongated stone mostly slabs broken are also found strewn in the area. The length ranges between 95 cms. to 110 cms. breadth 17 to 24 cms. and thickness 16 to 18 cms. They are of granite rock and 40 cms. deep inside the ground. They face East. Few potshreds of Black and Red ware on the eroded surface are also collected at these menhirs.

The present day memorial stones, menhirs, numbering about 27 are intact while several such stones are found in heaps on the bunds of the field since the area is under intensive cultivation. The stones erected measure between 65 cms. to 75 cms. length about 16 to 18 cms. in breadth and 10 cms. to 12 cms. in thickness respectively. They face East. These memorial stones are buried upto 35 cms. depth.

Pandavulametta :

Pandavulametta is the name of the site derived after Pandavas where the foot-print supposedly of Bhima are shown by the villagers. The site is located on a hillock of a low altitude. Microliths, few potshreds of Black and Red ware and Red ware are the surface finds. Red ochre pieces, and two small sherds of Black and Red ware are also collected at a depth of 40 cms. in a cavern by the side of the largest dolmens. Ten dolmens of which seven intact, are found. The size of the slabs used for cap stones is enormous. In fact about 15 to 20 people could easily take shelter in some of these dolmens. One of the dolmens is made up of two cap stones jointed and placed on a number of orthostat slabs boulders arranged one over the other. It is in the east-west orientation. The total length of the cap stone is 8.4 meters. Its breadth and thickness are 3.6 meters, and 30 cms. respectively. The stone slab supporting the capstone on an average measure 150 cms, 100 cms. and 17 cms. in length, breadth and thickness. The capstone of the smallest dolmen measures 255 cms. length 155 cms. breadth and 45 cms. thickness. It is placed on three rectangular orthostats whose average measurement is 81 cms. x 78.5 x 15 cms. Rest of the dolmens fall within the above two in their size. All of them are on exposed rock bed of the hillock.

The most interesting associated evidence is the presence of round holes encompassing the dolmens. There are twenty-six holes around the former arranged in a double row. One row with large holes and another with small holes. These rows are along the length and breadth around the dolmen. The bigger holes number, 13 while the smaller also account the same number. The smaller holes form the outer row. The difference between two is varied in diameter. However, these holes are in a single row only around four dolmens. Interestingly the big holes are uniformly the same dia measuring 14 cms. They have a depth of 21 cms. The smaller holes measure 9 cms. in dia and 12 cms. in depth. Another interesting feature of these is the presence of cup marks on the surface of the cap stone. They have about 9 cms. dia. Three or four cup marks are found on each of the cap stone. They are on most of the cap stones.

The row of holes around the dolmen could be interpreted as post holes to enable the erection of Pandals. A Pandal is erected during ceremonies, annual or biennial as observed today, while the cup marks are used to place food offerings to their ancestors.

Evidence of Black and red ware characterising Megalithic period is recorded at Kalingapatnam (IAR, 1958-59), Salihundam (Subrahmanyam, 1964; p. 36) and Srimukhalingam (IAR 1957 58) all within a reach of 15 to 20 kms., from the two megalithic sites. That the area was inhabited by Black and Red ware using people is clear from the above evidence. The question of Megalithic chronology at these two sites is not the concern of the writers as the objective is otherwise but some of these megaliths both at Pandavulametta and Siddulakonda might be ancient is beyond question. This is particularly so with Pandavulametta.

In the course of ethnographic investigations, it is found that the mortuary practices of Gadabas and Savaras inhabiting the hilly terrain of Srikakulam, Vizianagaram and Visakhapatnam Districts could be of immense help in the interpretation and understanding of the megaliths. The Savarapeta (Savara village) near Siddulakonda is now deserted as the people have moved about 4 kms., West into the hilly terrain congenial for their subsistence. Therefore this village is selected for a detailed enquiry into the mortuary practices of the Savaras. Panukuvalasa, 25 kms. west of Pandavulametta, a hamlet of Gadabas, associated with dolmens is another settlement investigated.

Savarapeta is about 3 kms. West of the Megalithic site. Savaras observe the death ceremonies strictly and their performance is elaborate. The dead is cremated along with ornaments and implements. However, those who die of some epidemic disease are buried. If a pregnant woman dies her belly is pierced at three places with a knife and is cremated. They believe that it will not rain in the area if they do not do so. In order to admit the dead properly into the ancestral world they observe the rites meticulously. A wooden figure is set first to accommodate the soul of the deceased till the erection of a memorial stone.

An elaborate ceremony called 'Guar', meaning erection of stone (Gua = to plant and 'ar' = arranging a stone, i.e., planting or erecting a stone) is performed after a good harvest in the year. This is always sometime after the death of a person. The wooden figure is brought ceremonially to their ancestral village Savarapeta at Siddulakonda, which is abandoned now. The close kin of the deceased and the priest go to the Siddulakonda and select an elongated stone or stone slab bring it to the burial ground belonging to their lineage. Different lineages erect stones little away from each other. Big stones for the elders and small stones for the youngers are selected. Vermilion and turmeric are smeared to the stone and wooden figure. Then a buffalo is sacrificed and its blood is smeared to the stone and the wooden figure. Liquor is offered to the dead. They invoke the spirits of their ancestors and request them to admit the spirit of the newly deceased into their abode. Some men assuming the role of the spirits of the ancestors declare that the newly deceased is free to join them as soon as the guar ceremony (erection of the memorial stone) is completed. Then the stone is erected and people return with the wooden figure to their settlement. A feast is arranged on the same day with the animal sacrificed. There is also a biennial great feast called 'Karja' celebrated for all those who died. This feast is more elaborate. More buffalos are sacrificed.

It is clear from this brief account that the Savaras always remember their ancestral place even if they migrate to another village. The memorial stones are always erected at their ancestral place in their own lineage burial ground. Different lineages have separate patch of land in burial ground with clusters of such memorial stones. But all the lineages join together in the 'guar' and 'Kharja' feasts.

It is observed that since the present Savara settlement is away from the abandoned settlement, the dead is either cremated or buried at the village itself as they cannot carry the same to the burial ground of their ancestors at the old settlement. Memorial stones are erected in the burial ground of their lineage whether it is near or away over the settlement. Thus the menhirs in these parts are the characteristic feature of the mortuary practices of the Savaras.

The mortuary practices of Gadabas have been dealt by few anthropologists such as Thurston (1909), J. H. Hutton (1922), Haimendorf (1943; pp. 148-187; 1945), Somasundaram (1949), Verrier Elwin (1950). Our observation of Gadaba mortuary practices at Panukuvalasa reveal a transformation from what has been described by the earlier writers. The major ritual feast, after the death of a person is almost the same as that of Savaras. The elaborate feast arrangements have descended to low level. The number of animal sacrifices and the fanfare that follows is reduced considerably.

There used to be two types of disposal of dead among the Gadabas described by the earlier writers, the cremation and burial. In the village under study only burial practice is observed whether rich or poor. The rituals associared after the death of the person are same as those of Savaras. The guar ceremony and the biennial Karja ceremony are also performed by the Gadabas.

The Gadabas have their own burial ground, separate patch of ground for each lineage. We see at most of the Gadaba villages a few dolmens, a few slabs of stones with a menhir behind the slab indicating memorial stones.

The enquiry with the aged people in this village reveals the following :

Earlier, their ancestors used to erect dolmens. This was carried only by the chief and a few rich people. Today whenever a dispute arises in the village, the chief sits on the cap stone of a dolmen and resolves the dispute. They believe that the spirit of the ancestor of the person who settles the disputes enters him and gives the correct judgement. This is accepted by the parties concerned. That this practice is found among the Gadaba villages even elsewhere at Madugula area of Vishakapatnam district is an ample proof that the dolmens are associated with the Gadaba tribe. The question as to how the erection of dolmens ceased among the Gadaba is quite interesting. However, another type of memorial was practiced till about two decades. A stone slab measuring 50 cms. – 60 cms. is placed at the head of the burial (not on the burial) and a menhir measuring 60 to 70 cms. is erected behind the slab. Even this is abandoned now. Two boulders are placed away from the burial, today, as memorial stones. It is not our objective to discuss here about the slow transformation of these memorial stones from one form into another. The objective is only to show the association of dolmens with Gadabas which is very clear.

The foregone description of the mortuary practices of the Savaras and Gadabas makes it clear that menhirs and dolmens are associated as memorial stones with Savaras and Gadabas respectively. The Savaras and Gadabas are the two endogamous groups inhabiting the agency tracts of Srikakulam district. In other words these two endogamous groups practice distinct mortuary practices in the form of two types of memorial stones.

This analogy, if extended to the two megalithic sites, Siddulakonda and Pandavulametta where two distinct groups of megalithic types are found. It is imperative that the two megalithic sites represent two endogamous groups.

What is more significant is the distinct practice of Savaras and Gadabas in the erection of memorial stones, the former the menhirs and the later the Dolmens. The Savaras and Gadabas are the two distinct endogamous groups. The practice of erecting distinct memorial stones reflects their cultural diversity even within the same geographical area. If this analogy is extended to the archaeological evidence of Megalithic type it can be interpreted that differerent types of megaliths are erected by different endogamous groups. In other words the occurrence of different megalithic types may be viewed as representing the cultural dichotomy within the human groups inhabiting the same ecological zone.

25. SOME RECENT ARCHAEOLOGICAL NOTICES : MEGALITHIC RELICS IN DAKSHINA KANNADA – A STUDY*

B. Vasantha Shetty

Though Dakshina Kannada is very rich in Archaological remains, it is unfortunate, that very little scientific and systematic study has been done. The credit of discovering the Megalithic remains in Dakshina Kannada goes to Dr.P. Gururaja Bhatt (1969) and Dr. A. Sundara (1974; pp. 62–71). Very recently the evidences of Microlithic age have been noticed by Dr. P. Rajendran.

In the northern part of the district I have noticed some Megalithic burials and they are spread over three taluks-Udupi, Karkala, and Kundapura. In Udupi taluk they are found at Bolugudde, Kelakunjal, Brahmavara, Mairkome, Barali, Kiradi and Bellarpadi. The places with Megalithic burials in Kundapura taluk are Ultoor Halladi–Harkadi and Kadase. In Karkala taluk Belanje and Chara are megalithic tombs. They are all laterite rock-cut cave chambers. In all the above places the burial chambers are circular on plan and hemispherical in elevation. At the central top is a circular opening facing the sky and this opening is covered with a thick rough slab. There is variation in the size of the chambers. Very recently I have discovered twelve megalithic tombs in Kakkunje village of Udupi taluk. Though all of them are disturbed, one of them is not completely in ruins (Pl. I). It is a port–holed cist built in east-westdirection. The chamber is of 2.22 mts. long, 1.98 mts. wide and 1.79 mts. high. Port–hole is in the western orthostat, 30 cms above the ground level. The Port-hole is 43-50 cms. in diameter. Hence it is slightly oval in shape. South-east of this megalith is another disturbed port-holed chamber tomb. Its orthostats have fallen except the eastern one. It is interesting to note that the port-hole in this burial chamber is on the eastern orthostat, oval in shape. Nothing could be traced in both the burials except a few small pieces of thin pottery. One of the megaliths is a stone circle. The others are badly disturbed and stone slabs are lying scattered in different places. These burials are spread over an area of 3/4 of a km. The site is an elevated area with rocks nearby and a small river on the northern side, separating Kakkunje from Harkadi. The latter is also a place of archaeological interest.

At Gavli in Halladi–Harkadi village of Kundapura taluk I noticed rock-bruisings (Fig. I, Pl. II) on two rocks. This area has huge rocks and rivulets and it must have been quite conducive for human habitation in pre–historic times. The bruisings found here are of bulls, the most common among the domesticated animals of pre–historic people. These figures have prominent hump and long horns bent towards one another. One of the figures is in moving posture. The front two legs are joined with one another and same is the case with the hind legs too. This probably indicates the depiction of the animal from a side view. In both the

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* Editor's note : The original paper by Dr. Vasantha Shetty consists of his critical notes on the Megalithic remains and inscriptions noticed by him. The part on the Megalithic remains is included in this volume and the other part on inscriptions will be included in the forthcoming Volume III on inscriptions in accordance with the plan of the publication of the Seminar Papers in three volumes.

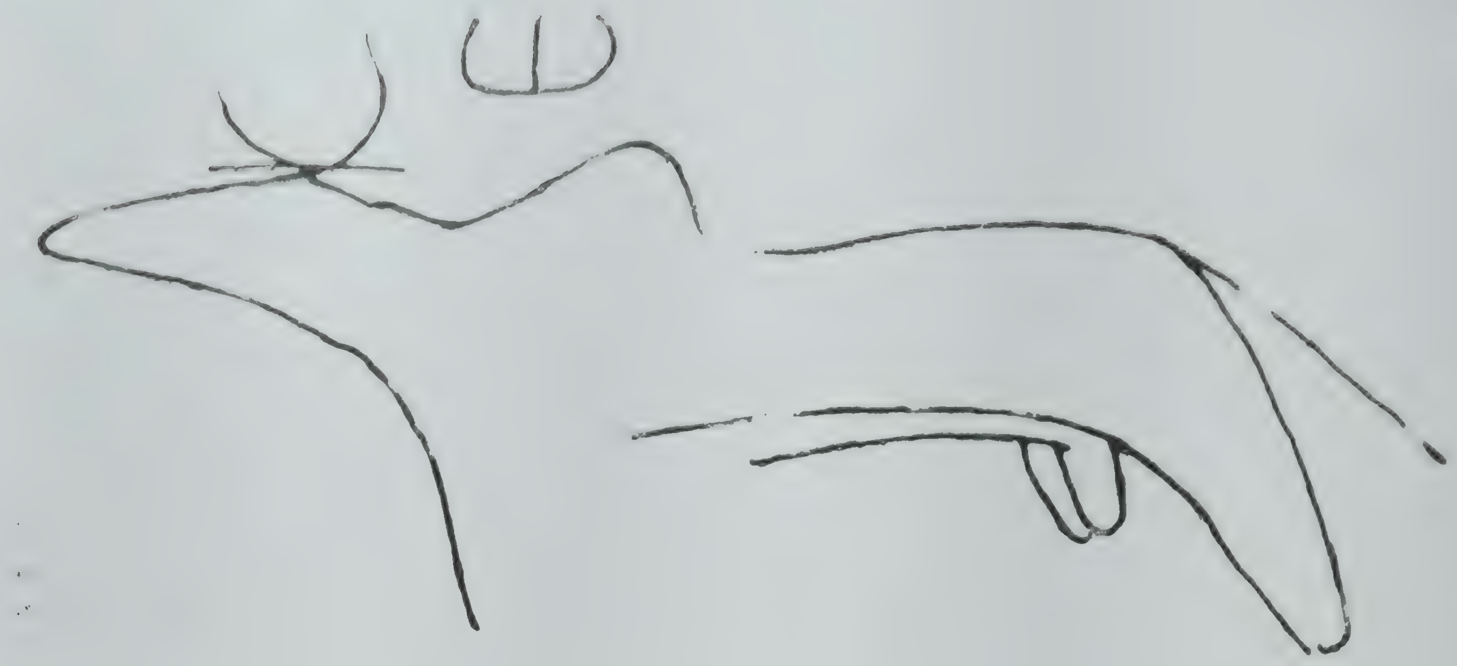
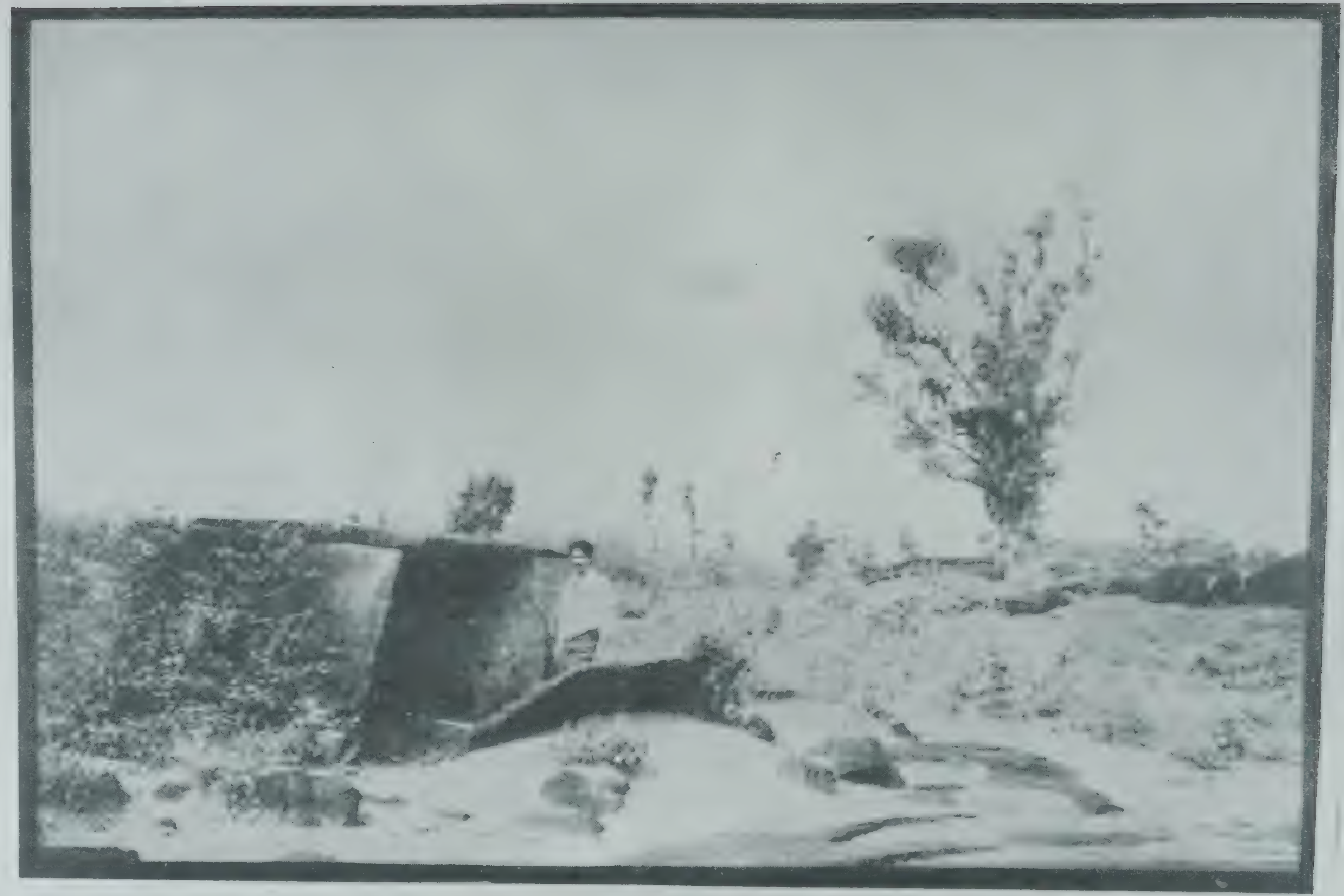


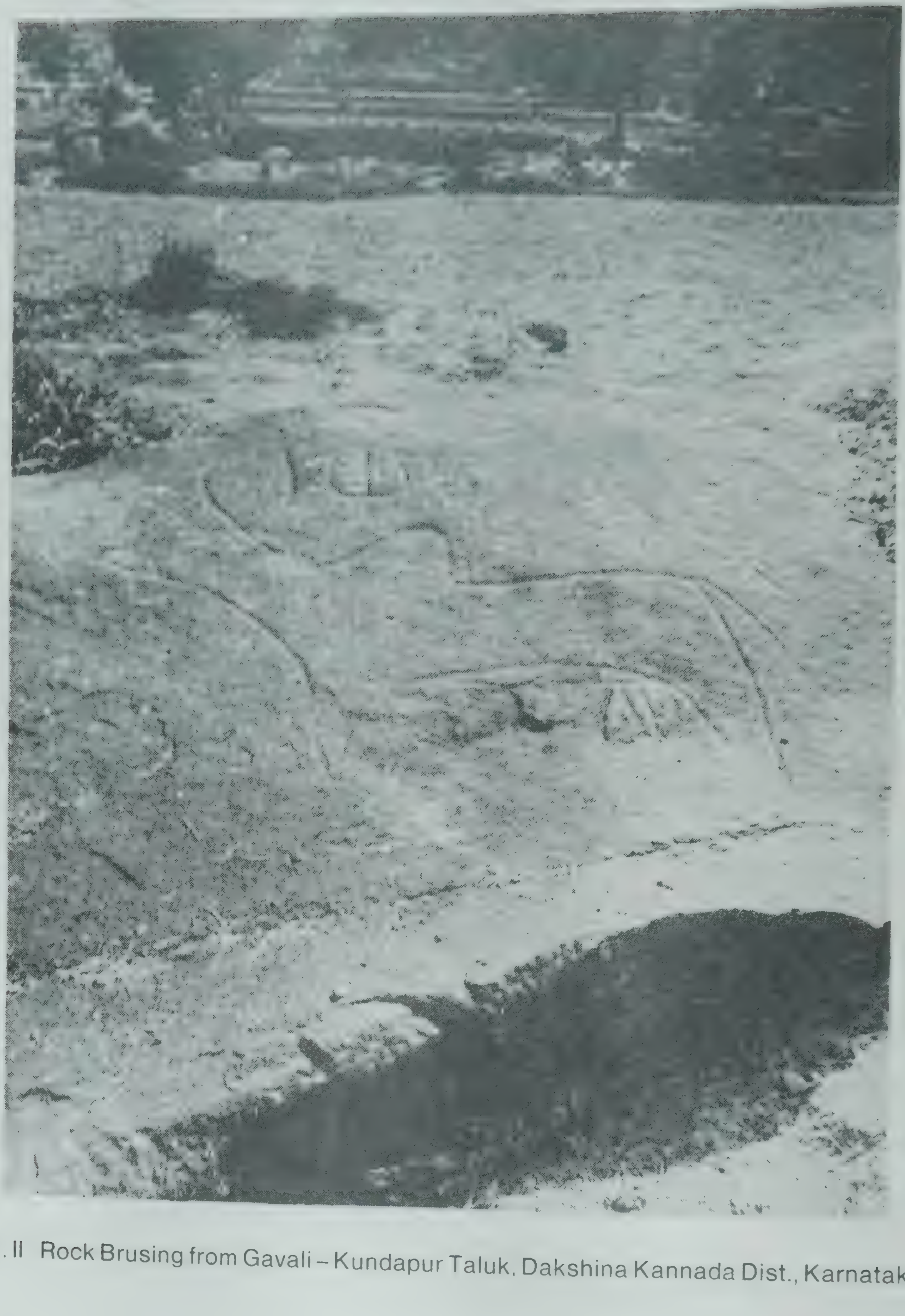
Fig I. Side view of animal & Rock Bruising from Gavali, Kundapur

figures, a horizontal line drawn detween the head and the horns is interesting. There is a geometrical figure on both the rocks; a circle with a dividing line.

One of the figures is found between the two horns, not joined with the main figure. But the other figure is depicted slightly above the main figure. Though it is difficult to date these figures, we can notice some comparison detween the figures of bull found here and those of pre-historic times noticed elsewhere. Now with the discovery of port-holed cists of Megalithic period, about 3 kms south east of this place and laterite rock-cut chambers 1 km to the north-west, it is possible to think that the whole area of Kakkunje and Halladi-Harkadi was inhabited by Megalithic people. Even this rock art must have been their creation.



Pl. I Megalith (port-holed Cist) from Kakkunje, Udupi Taluk, Dakshina Kannada Dist., Karnataka



Pl. II Rock Brusing from Gavali – Kundapur Taluk, Dakshina Kannada Dist., Karnataka

26. IRON OBJECTS FROM SOUTH INDIAN MEGALITHS (KARNATAKA)
- A Technological Study and Significance

O. P. Agrawal, Hari Narain and G. P. Joshi

Introduction

Artefacts found at the excavation conducted by archaeologists after the Independence revealed that iron smelting was at one time a widespread industry in India, and there is hardly a district away from the great alluvial tracts of the Indus, Ganga and Brahmaputra in which slag heaps and iron artifacts are not found. But the evolution of metallurgy of iron in ancient India is still shrouded in mystery.

More than 400 sites have been discovered distributed all over the South India. Some of the sites in Karnataka and nearby states along the border reported by S. Nagaraju (Nagaraju & Gururaja Rao, 1977; pp .321-329) are Brahmagiri, Maski, Piklihal, Sanganakaullu, Halingli, Hallur, T. Narasipur, Hunnur and Jadigenahalli in Karnataka, Nagarjunakonda, Kersarpalle, Yellesvaram & Pochampad in Andhra Pradesh; Paiyampalli, Kunnattur, Tirukkampuliyur, Uraiyur, Sanu, Amritamangalam in Tamil Nadu and Porkelain in Kerala. These sites yielded iron implements, like swords, daggers, lances, crowbars, flat axes, chisels, spades, hoes, sickles, bell hooks, wedges, knives, tripods, hooks, beils and objects of many other forms. The repertoire of iron objects in the megalithic grave sites is generally richer compared to what is found in the habitation sites.

The exavations of megalithic sites in South Maharashtra area are Takalghat, (Deo, 1970) Khapa, Junapani (IAR, 1961-62; pp. 32-34) Mahurzhari (IAR, 1958-59; p. 21), Naikund (Deo & Jamkhedkar, 1982), Khairwada (Deo, 1985; p. 90), Arni (Deo, 1985; p. 94) and Bhagi-mahari (Deo, 1985; p. 90) also revealed similar types of iron objects. Iron axes with cross ring fastener were typical finds from Mahurzhari. Recently a Deccan College team has unearthed the ruins of a furnace and slags in Naikund. Main findings from these graves were swords, spears heads, laddle, knife, arrow heads, chisels, axes, spike, fish hook, bangle horse kit and couldron. The period of Takalghat and Mahurzhari is 6th-7th century B.C. As a lot of variety of iron and other metal objects have been reported from megalithic sites, explored in the nearby places and states like Tamilnadu, Kerala Andhra Pradesh and Southern Maharashtra. Deo has remarked on these findings that "the available evidence shows that the megalithic people of Peninsular India have utilized different metals like Gold, Silver, Copper, Bronze and Iron. The number of objects found so far in these media is fairly large, implying either an uninterrupted supply of raw materials or definite sources for barter or exchange."

Amongst these megalithian sites the Karnataka sites are perhaps the earliest. Komaranahalli is one of the recently excavated megalithic sites in Karnataka, which has revealed iron objects of different types (IAR 1980-81; p. 29) Komaranahalli is just 12 kms. east of Hallur. (Nagaraja Rao, 1978; p. 19) Chalcolithic and Iron age level overlap at Hallur (1000 BC) and TL dates (Chakrabarti, 1985; p. 76) of Komaranahalli revealed also the period around (1100-1200 BC.) This exploration yielded iron arrow-heads, axes, knives, rods, daggers, swords, spear-heads etc. Thirty objects from this site were received in our Laboratory for proper conservation and examination. Out of this lot, eighteen were selected for technical studies. In this paper we are presenting the studies carried out on five objects. A detial of these objects is given in Table (I). Figure I shows the form of the objects.

Very little work has been done in this field to know, how and from which ores, iron was obtained, how it was fashioned and shaped in the form of tools and artifacts, and how the technology spread from one part to the other parts of India.

These objectives were examined by us with the following objectives :

(I) To know the manufacturing technique.

(ii) To know the development of heat treatment techniques.

(iii) Whether meteoric iron was used or not.

METALLOGRAPHIC EXAMINATION

Very small sections were cut from these objects with a diamond saw. The samples were embedded in a thermo plastic resin and prepared by standard metallographic procedures. The details of these cut sections is given in Table II. The depth of these cuts were not more than 10 mm. The notches in these artifacts were virtually invisibly restored by a skilled restorer. After cutting, it was revealed that all the objects were completely mineralized (mainly iron oxide) and cut sections after polishing revealed very small, one or two fragments of metallic crystals. It is difficult to make sound scientific observations on such corroded materials. But a study at a high magnification can help in detecting the Carbide structure in remanent metal crystals and relic carbide. Knox, 1963; p. 43) This technique was utilized for the study of these corroded objects. Etching was done by 2% Nital (A mixture of nitric acid in alcohol) and acid mixture (a mixture of 92ml HCl, 3ml. HNO_3 and 5ml H_2SO_4)

INTERPRETATION OF MICRO STRUCTURE

1. Spear, Lab No. Fe 156

Two small sections were taken from the zones (a) and (b) as marked in Fig I. 1.

The section of zone (a) after polishing revealed, at 31. 5x, the layered structure and cracks which appeared due to stress and strain in the metal Fig. II Examination at 125x revealed tiny metal crystals and elongated slag inclusions, embedded in the layers. Upon etching with 2% Nital the crystals revealed ferrite with pearlite islands, along with the relic carbide at 250x pl. I. The grain size of relic carbide is very small.

Cross sections taken from near the tip of the spear i. e., zone (b) also revealed the layered structure, cracks, some slag inclusions and some metal crystals. Crystals reveal ferrite with pearlite at grain boundry at 315x as was noticed in zone (a).

Tempered high carbon structure was present in the inner portion as well as on the surface in both zones which was revealed by etching with acid mixture, but due to heavy rusting the tempered structure on the surface was disturbed at some places. The metallographic estimation of carbon content at both places revealed the presence of lower carbon content in the inner portion in comparison to tempered regions.

CONCLUSION ON THE TECHNIQUE OF SPEAR

Investigation revealed that the spear was fabricated by lamination technique, in which low carburized and high carburized

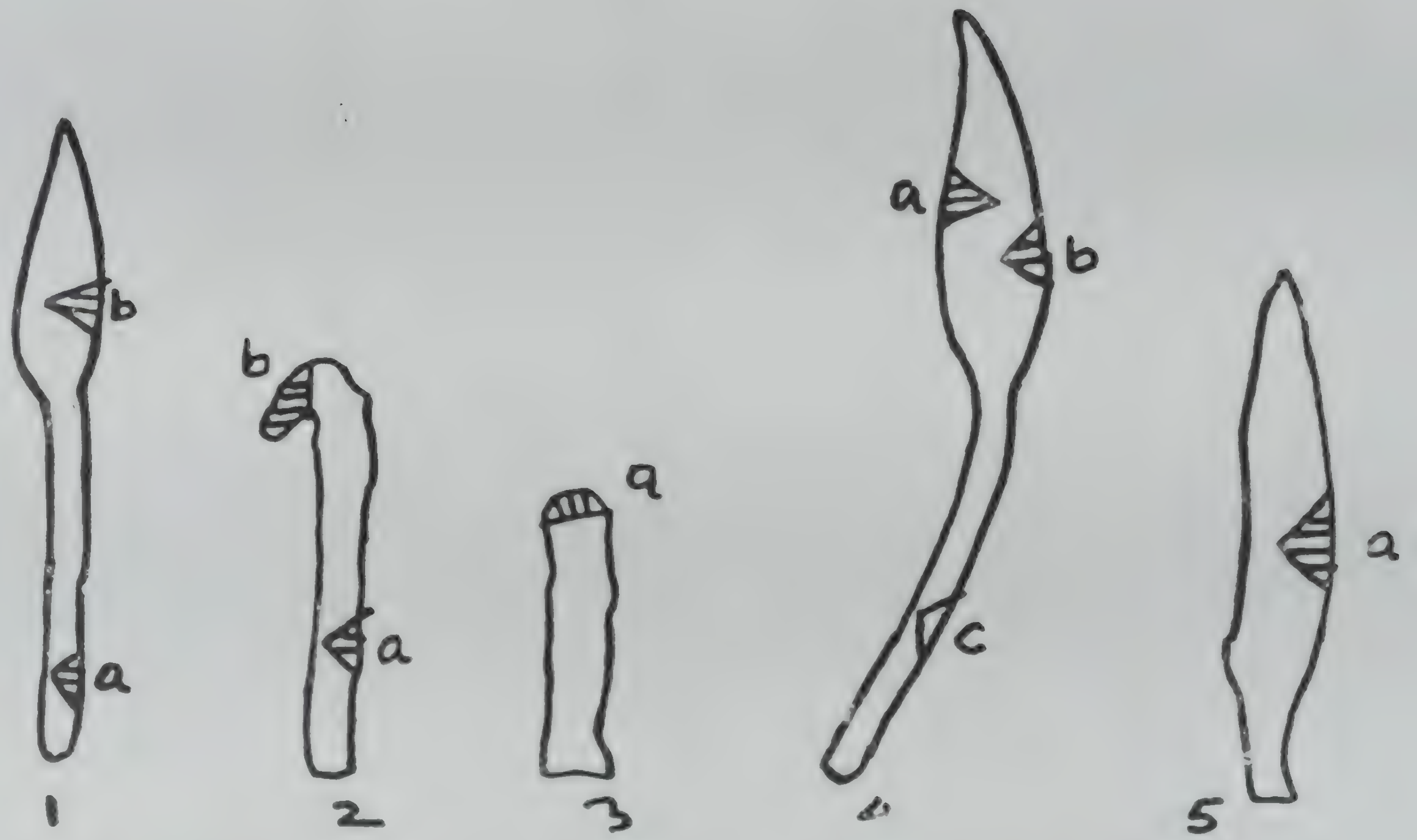


Fig. I. Iron objects showing sampling zones wiht cross lines in no. 1. Spear (lab no. Fe 156) no. 2. Rod with hook (lab no. Fe 157), no. 3. (lab. no. Fe. 159) no. 4 Spear (lab. no. Fe 161) and no. 5. Sword (lab. no. Fe 163) of Komaranahalli (Karnataka)

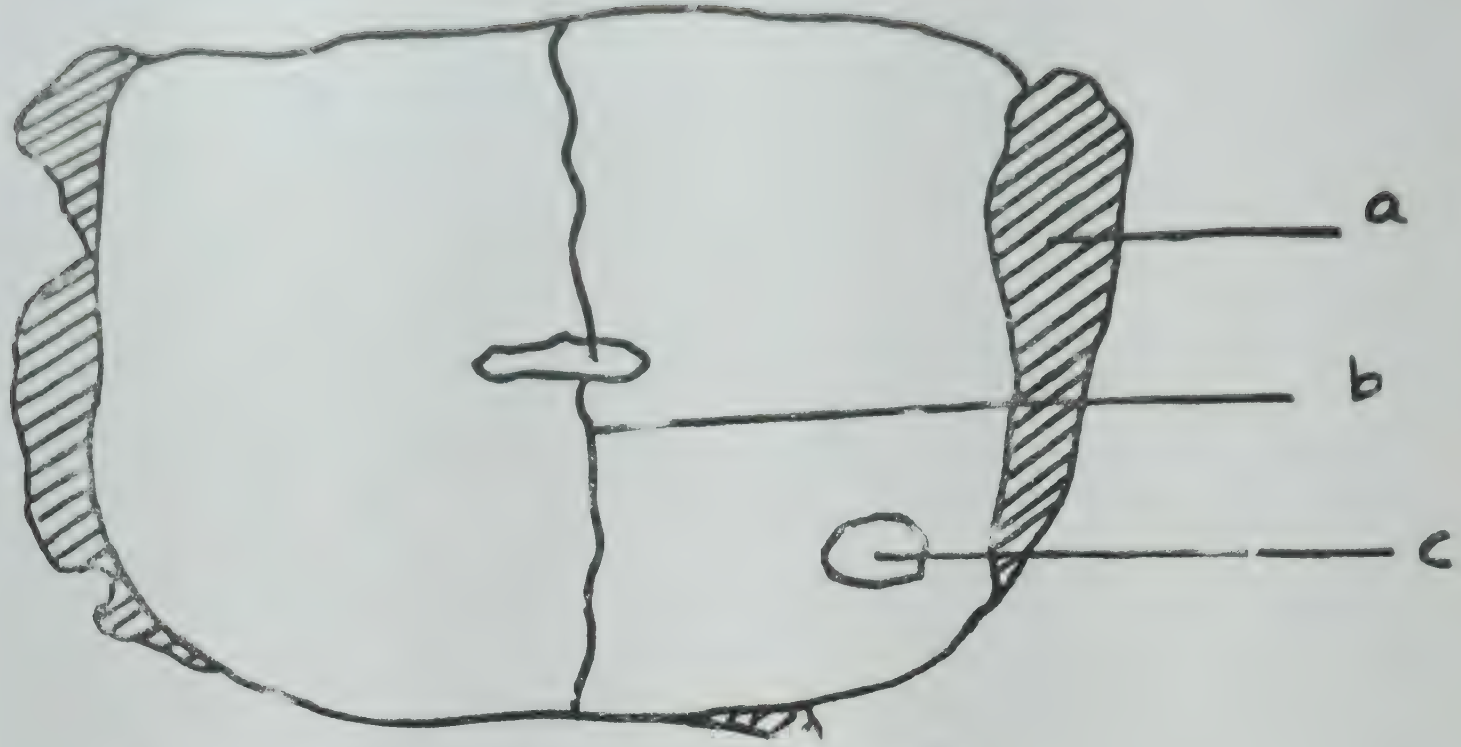


Fig. II. Sketch of a section of Spear (lab. no. Fe. 156) from zone (a) showing (a) corroded surface alongwith clay particles (b) crack and (c) location of pl. I.

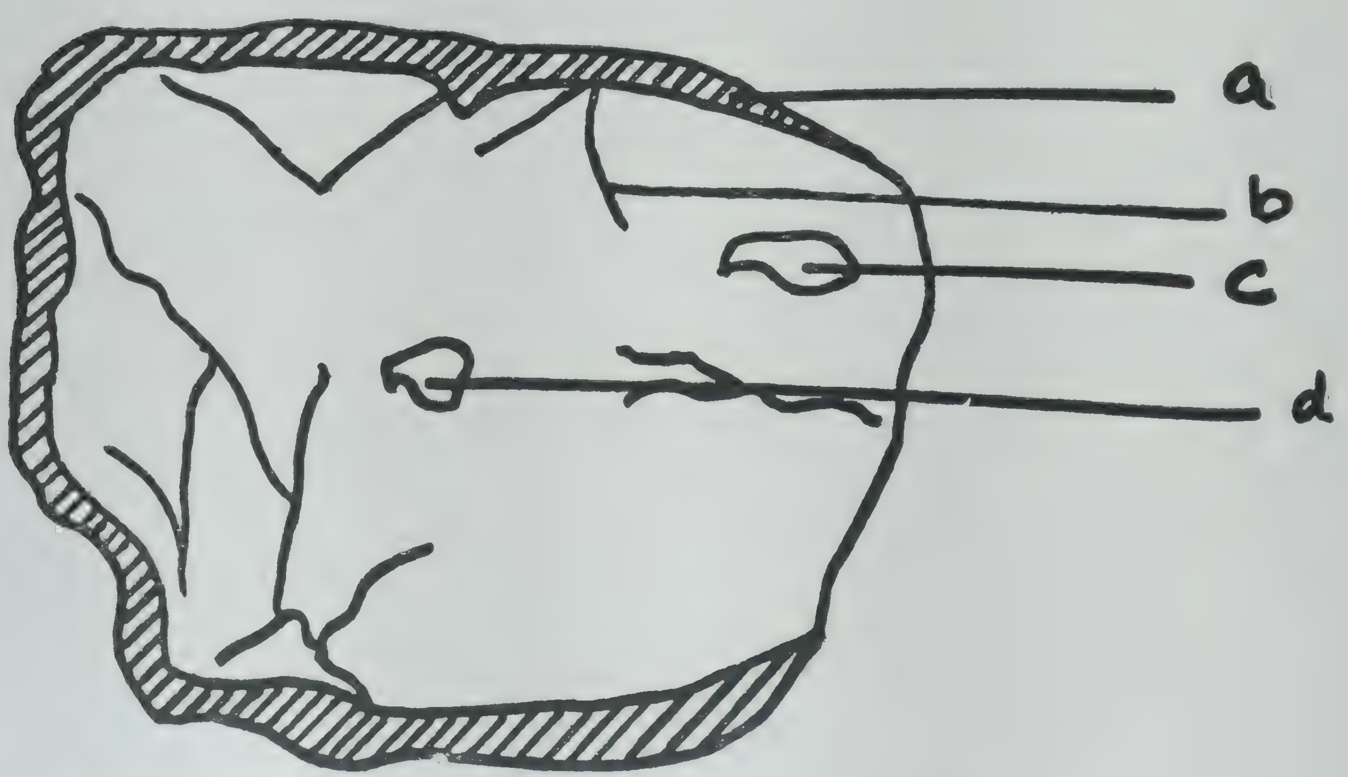


Fig. III. Sketch of a section of rod with hook (lab. no. Fe 157) from zone (a) showing a corroded surface along with clay particles (b) cracks (c) location of pl. II. and (d) location of hollow portion.

sheets are piled up one above the other and forged together into the shape of a bar. The bar was later on given the shape of the spear by forging. The small grain size of relic carbide and elongated slag inclusions revealed that this spear was heavily worked and tempered at low temperature. The presence of less slag inclusions in the blade of the spear in comparison to the tang portion indicated that special attention was given for the fabrication of the blade.

2. ROD WITH HOOKS LAB NO. Fe 157

Two small cross sections were taken from this object i. e. one from the zone (a) and another from the zone (b) as shown in Figures I, II.

The section (a) was cut from the broken middle portion of rod, which revealed big cracks and layered structure at 31.5x. A sketch of the section is shown in Figure III. The section revealed at 125x some tiny crystals entrapped in the layer structure alongwith some elongated black colour slag inclusions. Upon etching with 2% Nital, the crystals revealed ferrite with pearlite at 250 x Pl. II. Large size relic Carbide was noticed all over the surface. Further etching with the acid mixture for 5 seconds revealed the presence of high carbon (tempered layers) inside as well as on the surface. Tempered layer on the surface was not continuous as it was disturbed due to heavy corrosion and intermixing with clay particles.

The section (b) which is from near the top of the hook also revealed a layered structure and elongated slag inclusions and tiny crystals, which upon etching with 2% Nital revealed pearlite structures at 315x. This section also revealed high carbon (tempered) layers upon etching with the acid mixture.

It is difficult to estimate the carbon content in the tiny metal crystals, but the over all metallographic estimation of carbon content of zone (a) and (b) revealed that the zone (a) is having more carbon content than the zone (b) i.e. the hook portion.

CONCLUSION ON THE HOOK

This artifact was also prepared in the same manner as the spear (Lab. No. Fe. 156) the only difference is that it was tempered at slightly elevated temperature than lab no. Fe. 156 to remove the brittleness in the rod. The high amount of carbon content in the rod than the hook suggests the possibility that two or more than two laminated bars with different amounts of carbon were forged together.

3. BAR LAB No. Fe 159

A cross section from near one end of the bar was cut very precisely with diamond saw without disturbing its authenticity, as marked in Fig. I, Pl. I.

This cross-section revealed at 125x some metal crystals in layers alongwith a very few elongated slag inclusions. A sketch of the section is shown in Fig. IV. Upon etching with 2% Nital, the Crystals revealed the pearlite structure at 630x Pl. III. Further etching with Acid mixture it revealed relic carbide in layers at 315x and also revealed the tempered high carbon layers inside as well as on the surface. Metallographic estimation of carbon content in the metal crystals revealed it to be between 0.5% to 0.6% of carbon.

Conclusion on the Bar

Above studies revealed that these megalithian smiths first prepared these small bars by following the lamination technique which were later on used for the fabrication of spear, sword, dagger, other weapons and implements big in size.

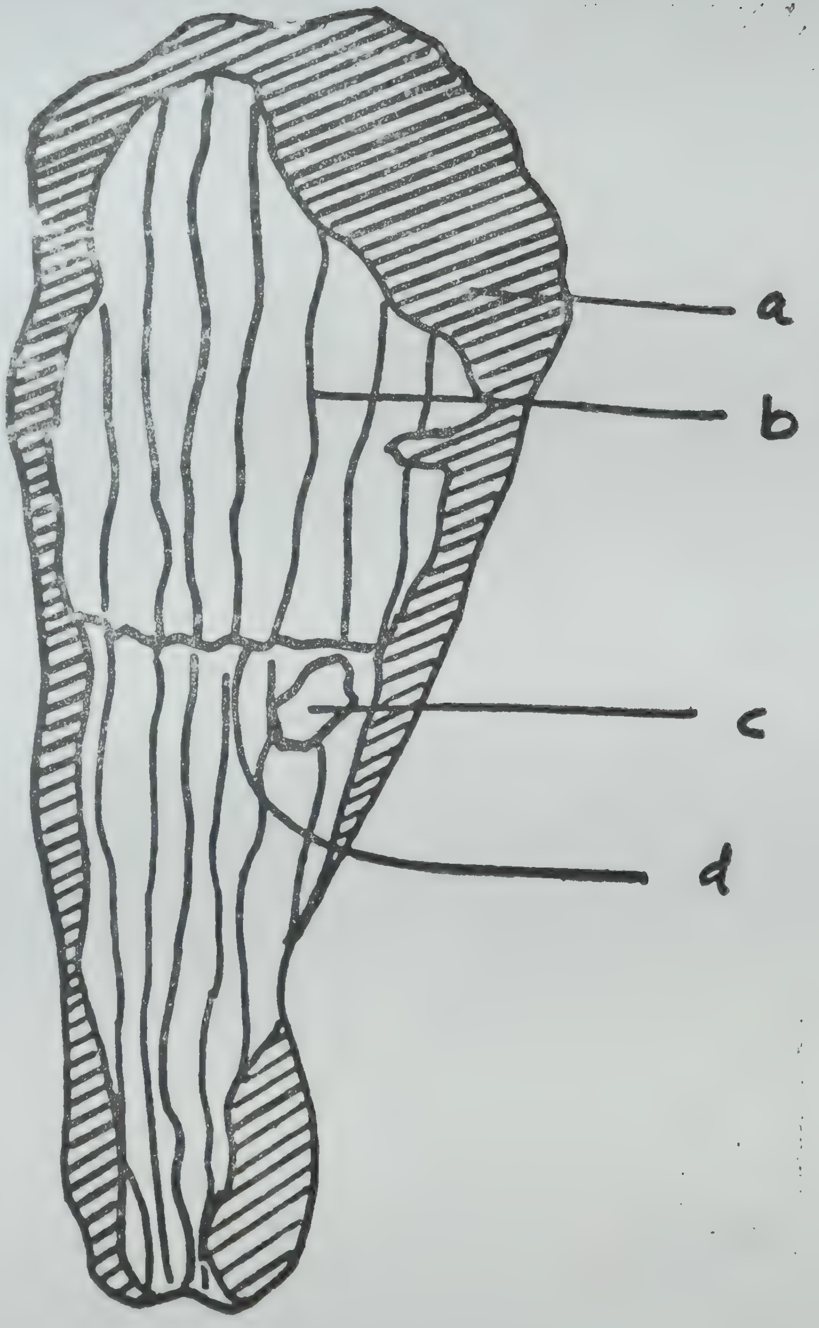


Fig. IV Sketch of a section of Bar (lab. no. Fe 159) Showing (a) corroded surface alongwith clay particle (b) layers of high carbon sheet (c) location of pl. III and (d) Crack.

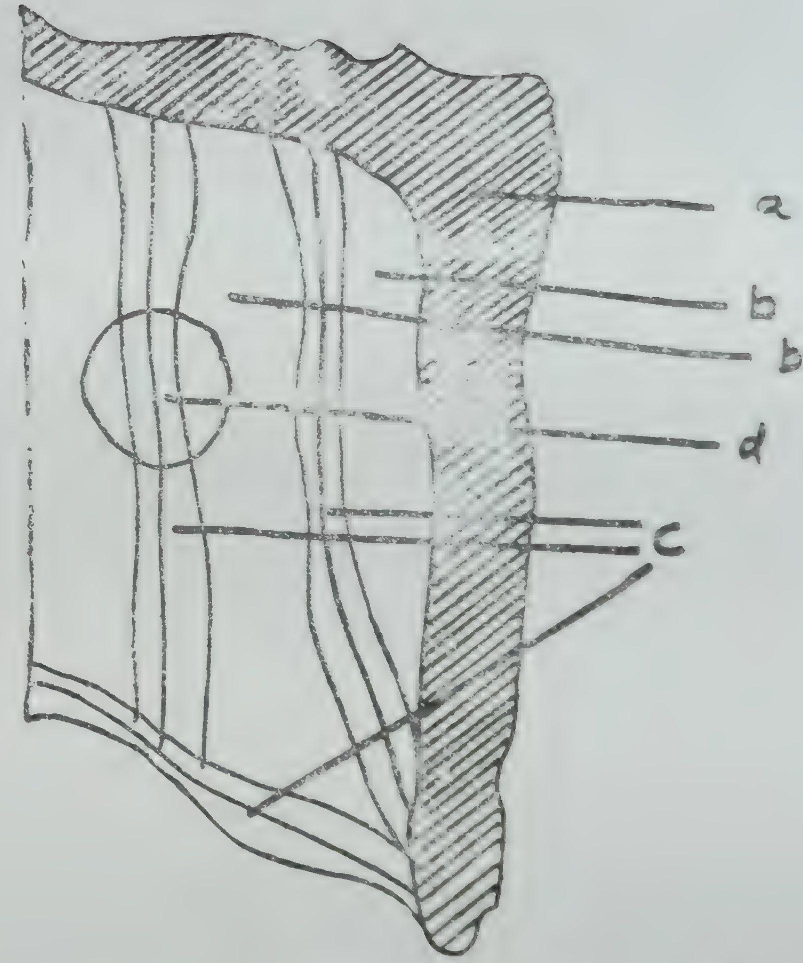


Fig. V. Sketch of a section of Spear (lab. no. Fe. 161) from zone (a) showing (a) corroded surface with clay particles (b) low carburized sheets (c) high carburized sheets and (d) location of pl. IV.

4. SPEAR LAB No. Fe 161

Three sections were taken from different parts of this spear-two from each side of the blade and one from the body portion as marked in Fig. I, III.

A V-shape section from the zone (a) of the spear revealed the completely mineralized lamination structure without any metal crystal at 125x. A sketch of the section is shown in Fig. V. Etching with 2% Nital at 250x, revealed layers of low carbon content large grain relic carbide, alongwith broken elongated slag inclusions present all over the section. Further etching with the acid mixture revealed at 250x the presence of high carbon tempered layer near the surface as well as inside the section Pl. IV.

Almost identical structure was revealed from the other side of the blade i.e., zone (b). A section from the body portion of the spear i.e., zone (c) in the sketch as shown in Fig. VI revealed layered structure and more amount of elongated slag inclusions at 250x as compared to zone (a) & (b). Etching with the acid mixture revealed the same type of structure Pl. V as present in the blade but with small grains. This shows that the blade was given tempering at slightly high temperature. Metallographic estimation revealed that the carbon content was slightly more in the blade than in the body of the spear.

Conclusion on the Spear

Investigation on the spear revealed that

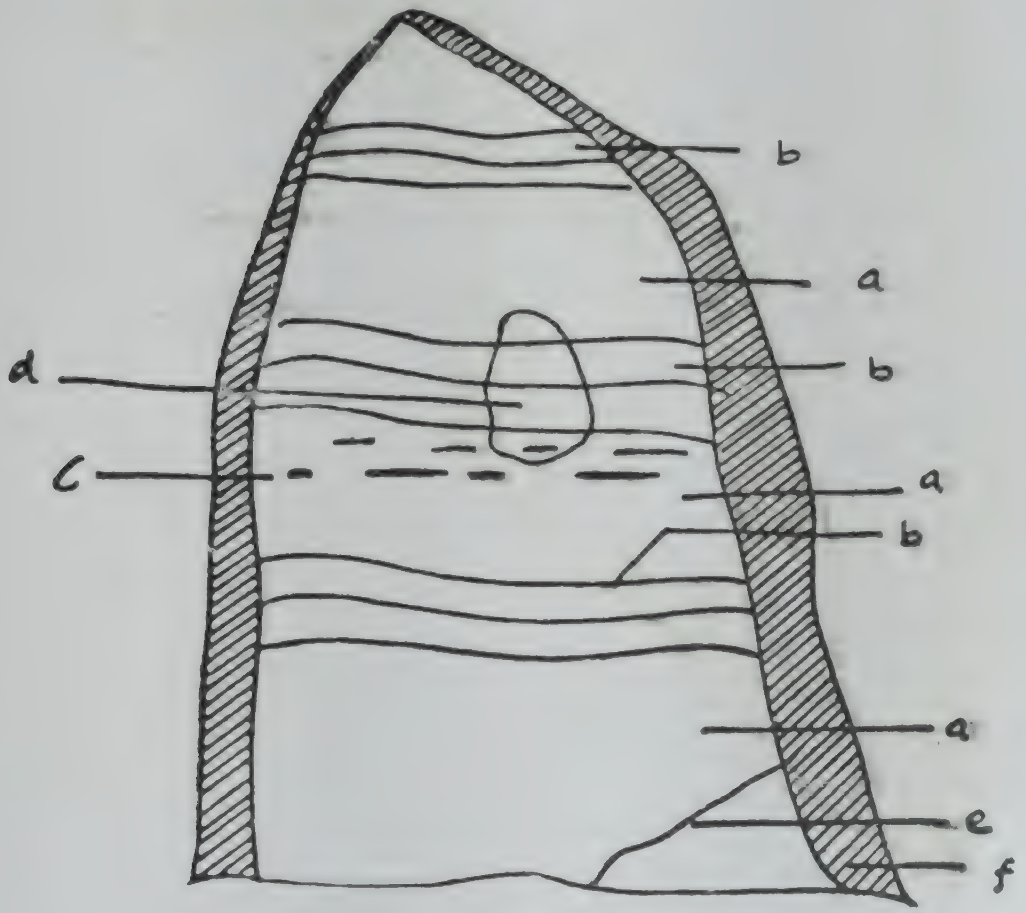


Fig. VI. Sketch of a section of Spear (lab. no. Fe. 161) from zone (c) showing (a) low carbon area (b) high carbon layers (c) elongated slag inclusions (d) location of Pl. V (e) crack and (f) corroded surface with clay particles.

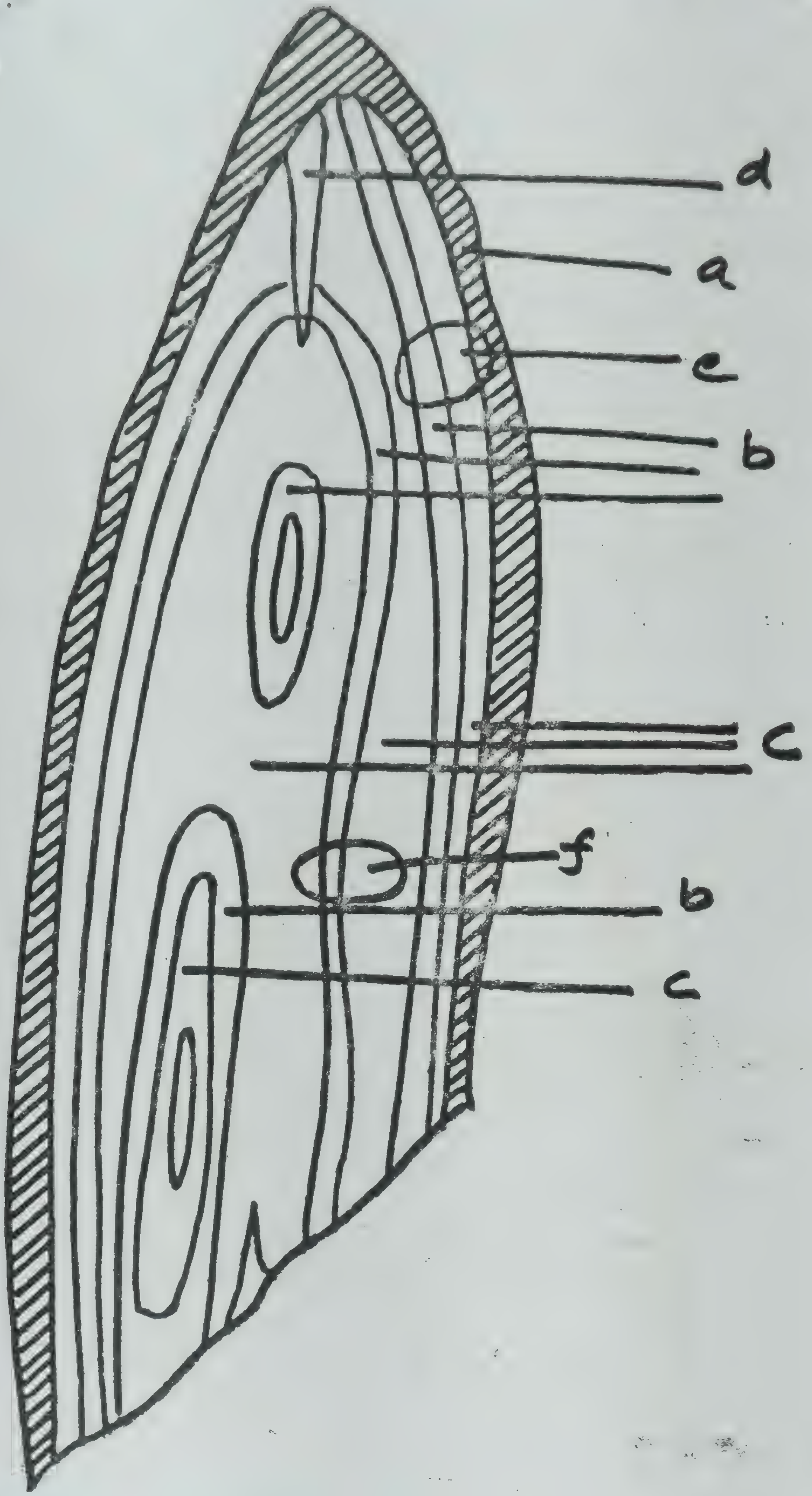


Fig. VII. Sketch of a section of sword (lab no. Fe 163) showing (a) corroded surface with clay particles (b) high carbon layers (c) low carbon area (d) crack (e) location of Pl. VI and (f) location of pl. VII.

this was also prepared by lamination technique. The piles used for its fabrication were having alternating layers of high carbon, low carbon and pure iron. These piles were forged and folded during the fabrication. The presence of high carbon in tha blade revealed that different types of piles were used for the blade than for the other portion of the spear which further strengthens the theory that the blade was harder and different from the body which is 178 cms. in length and 2.8 cms. in diameter.

5. SWORD LAB No. Fe 163

A-V shape cross was taken from one edge of the blade as shown in Fig. I, Pl. II

Similar to other objects this sword also revealed a layered structure, with few elongated slag inclusions at 125x. The sketch of the section is shown in Fig. VII. The polished section revealed some metal crystals at 250x. Upon etching with 2% Nital, crystals revealed the pearlite structure. The section after further etching with the acid mixture revealed high carbon (tempered) layer inside as well as on the surface at 250x Pl. VI, VII though surface high carbon layers were not distinct at some places due to severe rusting and mixing with clay particles at the surface.

Metallographic estimation of carbon content of the metal crystals revealed the presence of 0.5%-0.6% C.

Conclusion on the Sword

This sword was also prepared by the lamination technique by forging and joining together a number of small bars as followed in the case of the spear Lab no. Fe 161. The presence of tolerably high amount of carbon made it sufficiently tough, wear resistance and sharp to cut harder things in just one stroke.

Spectro Chemical analysis of the specimen reveal the presence of copper as trace, whereas the presence of nickel and cobalt was not detectable. It would mean that meteoric iron (Moss, 1975; p. 11) was not used for their fabrication, but some iron ore having copper as impurities was employed.

INTERPRETATATION AND DISCUSSION

Our investigations with the above five artifacts i. e. two spears, one sword, one bar and one rod with hook, revealed that all these artifacts were prepared by following the lamination technique. Megalithian smith of Komaranhalli used the metal, which was extracted from the iron ore by direct process. Pure iron was removed from the bloom by repeated forging. Metal pieces were later on carburized in the furnace as per the need of the artifacts. All these metal pieces of carburized and highly carburized iron were placed together, forged and folded. The final folding of the pile was done in such a manner that high carbon layer must appear on the surface as well as inside the pile along with low carbon layers. These small piles were later on joined together and given the shape of the spear on the sword, etc.

Presence of high carbon imparts the toughness. Whereas low carburized iron imparts good flexibility to with stand the sudden blow. High carbon tempered structure which was prominently present in only the blade of the spear (lab no. Fe 161) and the sword (lab no. Fe 163) shows that the smith might have adopted this to impart extra toughness and sharpness. This technique imparts internal as well as external strength to the spear and the sword.

Another megalithic site Tadakanahalli 16. 17 of the same period i.e.1000 B.C. in Karnataka also revealed the same level of technological skill, but the only difference is that the artifacts from the Komaranhalli are much bigger and thicker in size. This further strengthens the theory that the smith of Komaranahalli might have attained enough proficiency in handling and forging of bigger weapons of size 178 cm. in length as well as small tools.

Earlier technical studies performed by other scientists on the artifacts belonging to different parts of India of different period uptill now, are from Barudih (Bihar), (Ghosh & Chattopadhyay, 1982; pp. 63-64) Atranjikhera (U. P.), (Agarwal, 1982; pp 487-489) Mahurzhari (Maharashtra), (Deo, 1973) Dhatwa (Gujrat) ,(Hegde, 1973, pp. 416-21) Wurrigaon (M.P), (Forbes, 1964; p. 164) Rajghat (U. P.), (Bharadwaj, 1979), Prakash (Attavale, pp. 135-139) Kausambi (U. P.), (Prakash & Singh, 1968; pp. 529-32), Basenagar (M.P.) (Marshall, 1951; p. 536) Taxila (WestPakistan), (Marshall, 1951, p. 536) and Bhardwaj Ashram (Lal, 1981; p. 32. Agarwal & Narain).

An iron tool from Barudih (Bihar) of early first millennium B.C.reported by Ghosh was made of a low carbon steel with hardness VPN 110-127.

Examination in our Laboratory of some iron object pieces from Atranjikhera excavations belonging to early iron age PGW culture, indicated that they were hardened by case carburization.

Deo reported an iron axe from Mahurzhari of 6th- 7th Century B. C. made of 0. 9% C steel.

A hoe from Dhatwa (Distt. Surat, Gujarat) of 5th Cent. B.C was examined by Hegde and the finding revealed that it was fabricated by lamination process and its surface and inner hardness was VPN 117-123 and VPN 99-100 respectively. Some steel weapons found at Wurrigaon (M. P.) belonging to 6th century B.C. now kept in the British Museum also revealed that the conversion of iron into steel was known in this region.

Artifacts from Rajghat (U. P.) belonging to 6th -4th century B.C.on examination showed that they were of case hardended steel. Studies done on artifacts excavated at Prakash a chalcolithic site in the Tapti valley of 1st century B.C. revealed that these were fabricated from low carbon steel.

A broken sword from the Basenagar (Dist. Vidisha-M.P.) of 125 B C. was having the quenched and tempered structure with micorhardness BHN 146.

Prakash and Singh reported some iron artifacts from Kausambi of 100 B.C. which revealed the steel structure. Artifacts from Taxila (West Pakistan) a double edge sword (1.3%-1.5% C) and carpenter adze (1.23%C) belonging to 100 A.D. was reported to be made of high carbon steel. Microhardness of the double edge sword was BHN 235.

Examination in our laboratory of four iron objects from Bhardwaj Ashram (Allahabad U.P.) belonging to Gupta period (3rd Cent. AD-6th Cen. AD) indicated that these were prepared from wrought iron, low carbon steel and mild steel. Techniques used for their fabrication were case-carburization and lamination.

It may be mentioned here that artifacts fabricated by layering technique have also been reported from areas outside the Indian territory. The earliest known laminated iron object outside India is a knife from the Ramesseum (Carpenter Henri & Robertson, 1930; pp. 427-56) dating to 900-800 B.C. Muhly et al have reported several iron objects of the type. An iron adze from Almina (Muhly, Wheeler & Maddin, 1971; pp. 156-161) (5th-4th Century B.C.) was shown by them to have been fabricated of multiple layer. 4th cent. B.C. Sarmation dagger was made of two or three layers of iron of varying carbon content. An Etruscan spearhead of the 3rd century B.C. and a Roman saw and knife from Oxyrhychus were also made of multiple layers, indicating that the technique continued to be used in Mediterranean area in the 4th–3rd cent. B.C.

CONCLUSION

Above investigations show that the Megalithic people of Peninsular India had mastered the layering technique for the fabrication of iron artifacts around 1100–1000 B.C. whereas the smith in other parts of India were still in experimental stage. The attainment of such a high technical skill is not a matter of few years. This means that these smiths must be experimenting for centuries to reach this stage around 1000 B.C. They were badly in need of tools which would cut out rocks and big tree trunks. Stone and pure iron tools could not do this job so easily. Even the case–carburized tool cannot perform the job, as they are not enough wear resistance and smith have to recarburize them repeatedly.

On the basis of the studies done so far, the following conclusions are drawn :

1) These objects from Komaranhalli and Tadakanahalli fabricated by lamination technique in which wrought iron, low carburized and high carburized Iron sheets were used. This technique was also known to smiths of Dhatwa in (5th Centnry B. C.) and Bhardwaj Ashram in (3rd-6th century A D).

2) The Megalithian smith had also attained the skill of making homogeneous carburized iron (steel) from pure iron (wrought iron) and were having good knowledge of the art of quenching and tempering. Whereas the quenched and tempered artifacts from the other parts are reported only from Basenagar (125 B.C).

3) The Megalithian of Karnataka did not use meteoric iron for their artifacts but used iron ore having some copper impurity.

Study of more iron artifacts from earlier dated megalithic sites may throw light on the development of iron technology i. e. how they developed from wrought iron to case-carburized iron and then finally to lamination technique. It is difficult to say where and how iron was first of all discovered and smelted but this could very well be some place in south India. It could also be possible that after the discovery of iron in South India, it spread to other parts of India. However, these are the questions which can be decided only by more detailed metallurgical studies of iron artifacts from various sites,as in comparison to excavated object only a few have been metallurgically analysed.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. M. S. Nagaraja Rao, earlier Director of Archaeology and Museum, Govt of Karnataka and at present Director Genaral, Archaeological Survey of India, New Delhi for providing us the material for examination and for many useful discussions. Thanks are also due to Dr. A. Sundara, present Director of Archaeology and Museums, Karnataka, for his interest in these studies.

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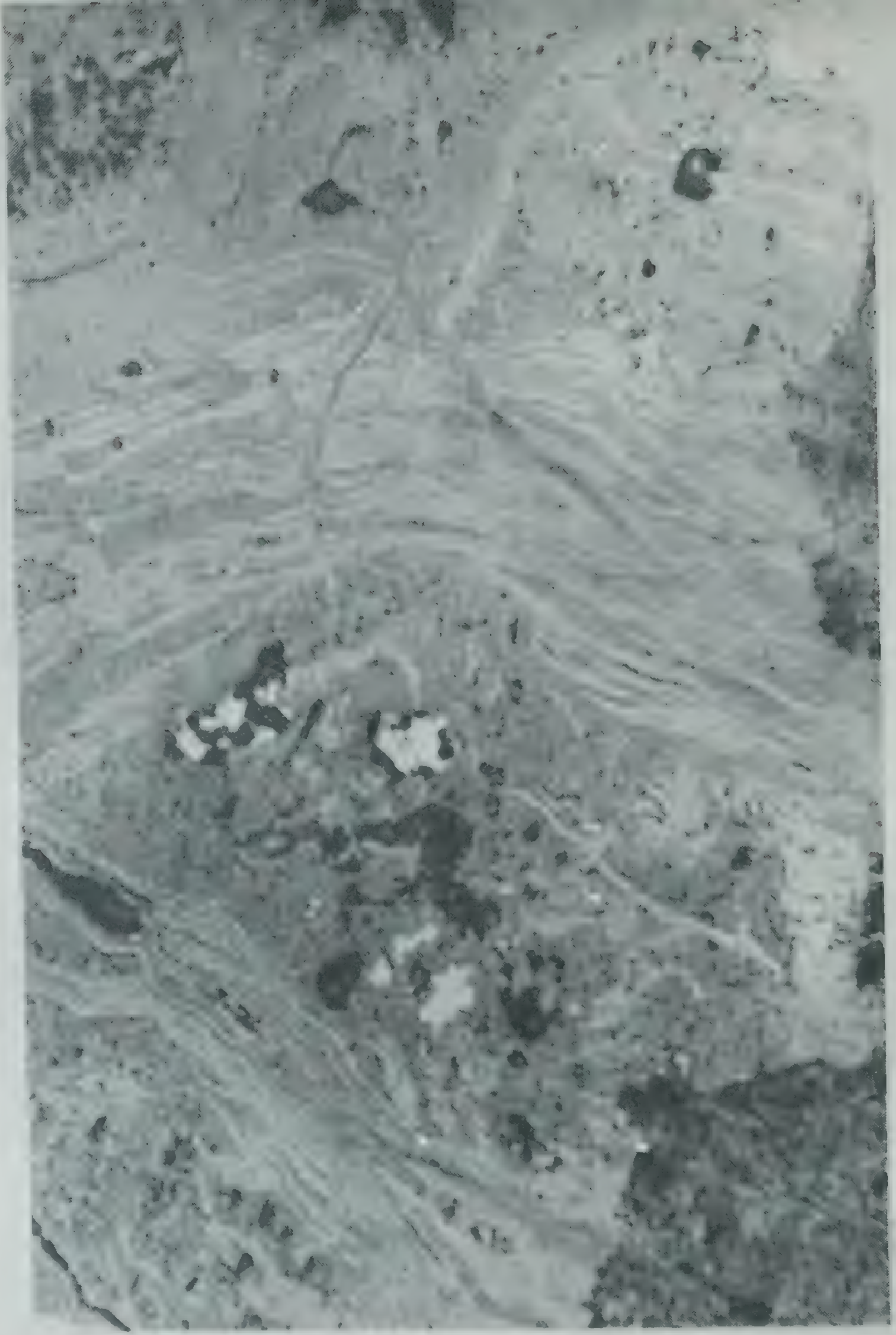
Table I
Details of iron artifacts subjected to metallurgical study from Komaranahalli [Karnataka]

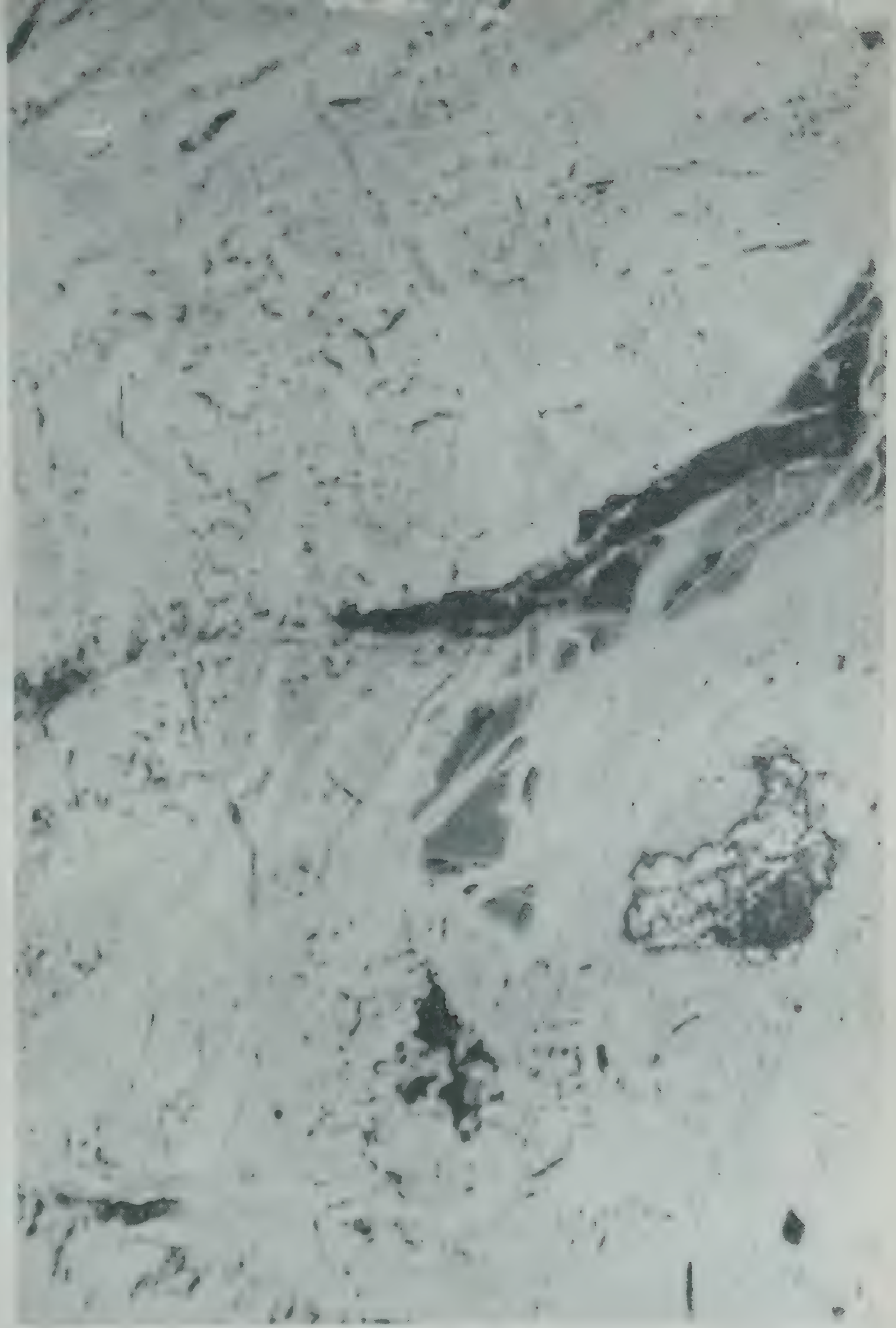
Sl. No.	Lab. No.	Artifact Description	Cultural Association	Thickness (Averages) Cms.	Length Cms.	Breadth Cms.	Dia Max Cms.	Weight gms
1.	Fe 156	Spear	Megalith (1100–1200 BC)	1.0	55.60	1.0	1.0	150 g
2.	Fe 157	Rod with hook	-do-	1.3	37.0	1.1	1.1	120.0
3.	Fe 159	Bar	-do-	0.5	5.6	1.4	—	12.20
4.	Fe 161	Spear	-do-	2.8	178.0	2.8	2.8	2300 g.
5.	Fs 163	Sword	-do-	1.0	69.0	6.6	—	1250 g.

Table II
Samples examined from Komaranahalli [Karnataka]

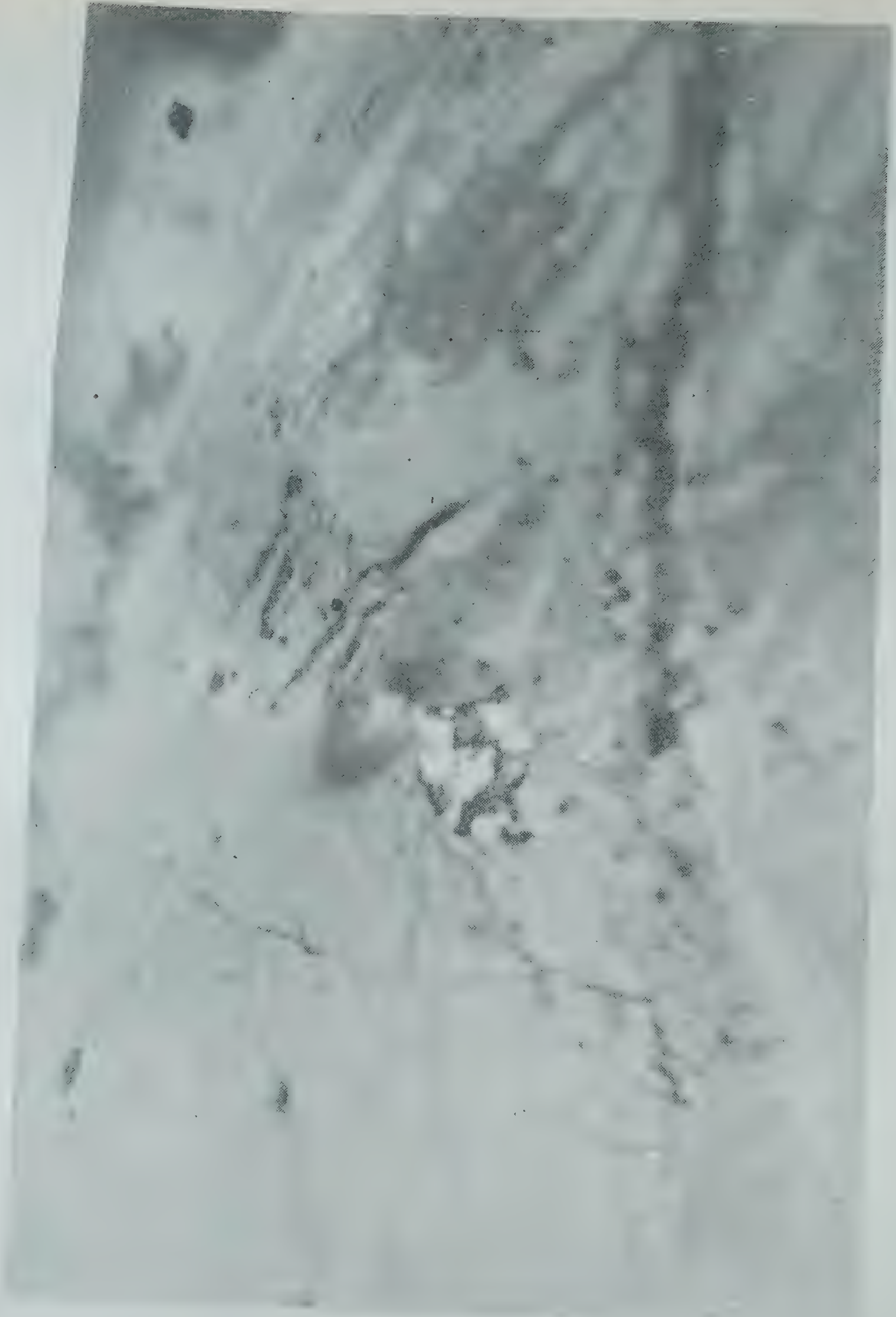
Sl. No.	Artifact Description	Lab. No.	Accession No.	Sample size (mm)
1.	Spear	Fe 156 (a) Fe 156 (b)	10	10 x 7 10 x 3
2.	Rod with hook	Fe 157 (a) Fe 157 (b)	11	10 x 7 3 x 2
3.	Bar	Fe 159	18	9 x 2
4.	Spear	Fe 161 (a)) Fe 161 (b)) Fe 161 (c))	20	6 x 6 9 x 8 10 x 5
5.	Sword	Fe 163	25	10 x 7



Pl. I Microstructure of pearlite and relic carbide in metal crystal and mineralized section at 250x Etchant 2% Nital

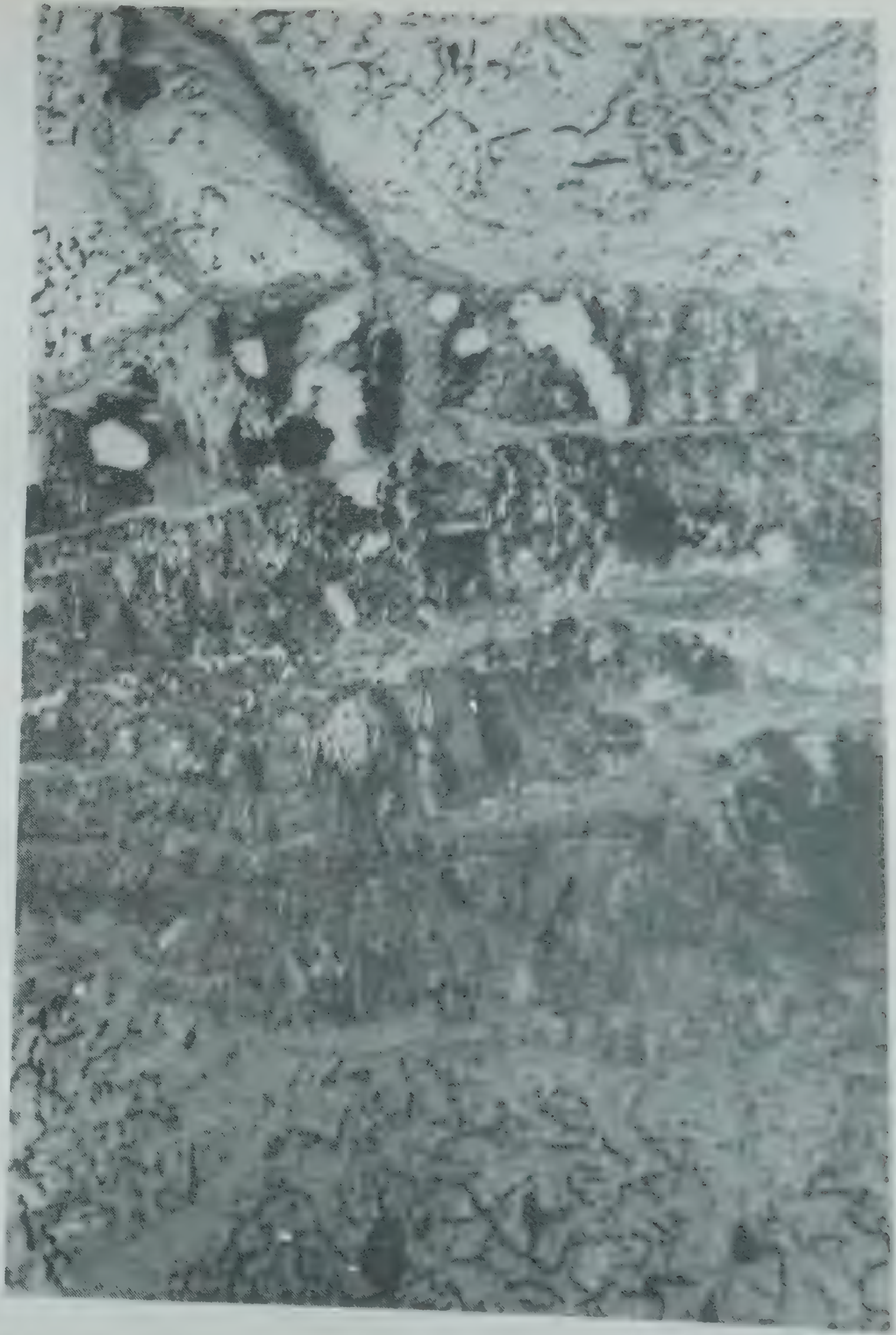


Pl. II Microstructure of pearlite in metal crystal relic carbide along with black slag inclusion in mineralized area at 250x. Etchant 2% Nital

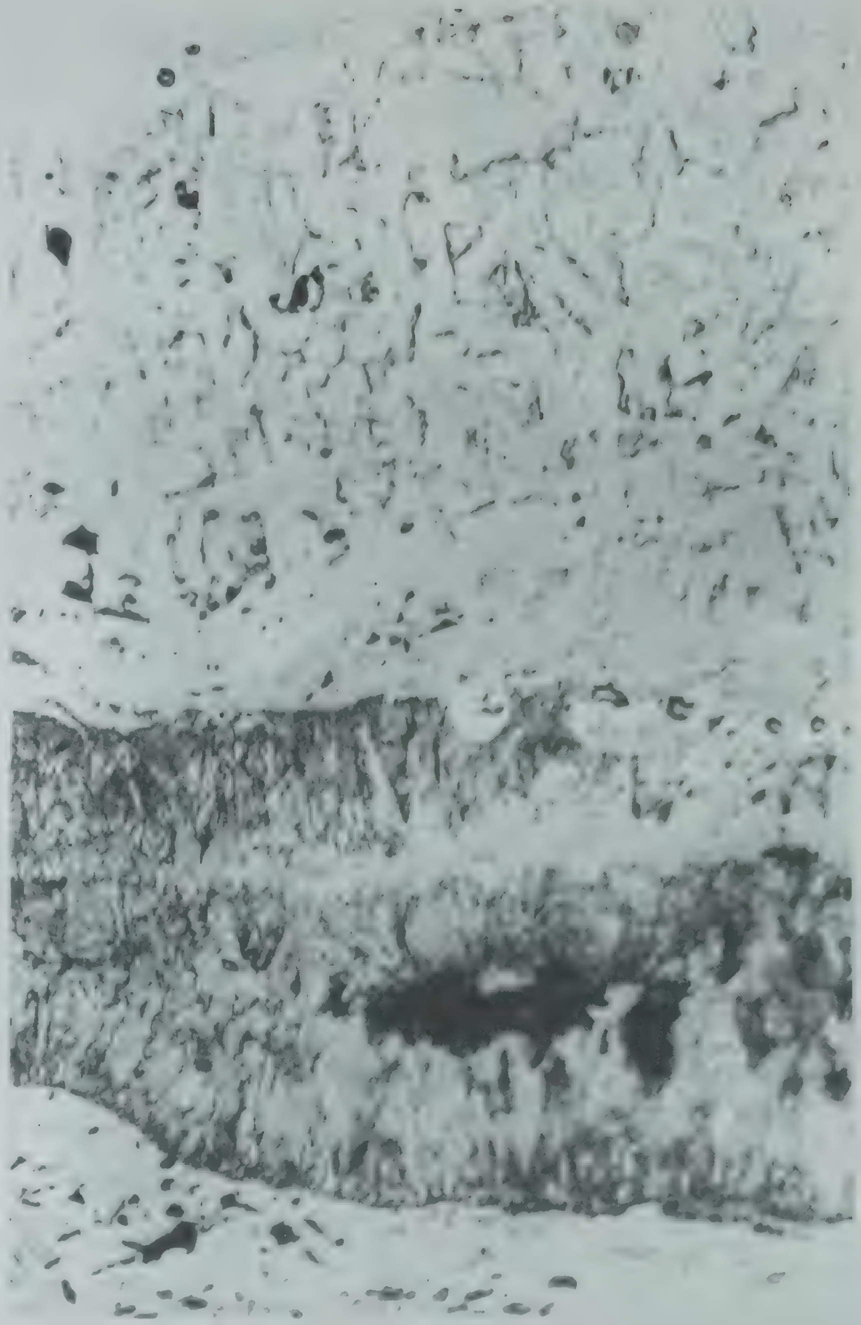


Pl. III Microstructure of pearlite and ferrite in remnant crystal at 630x.

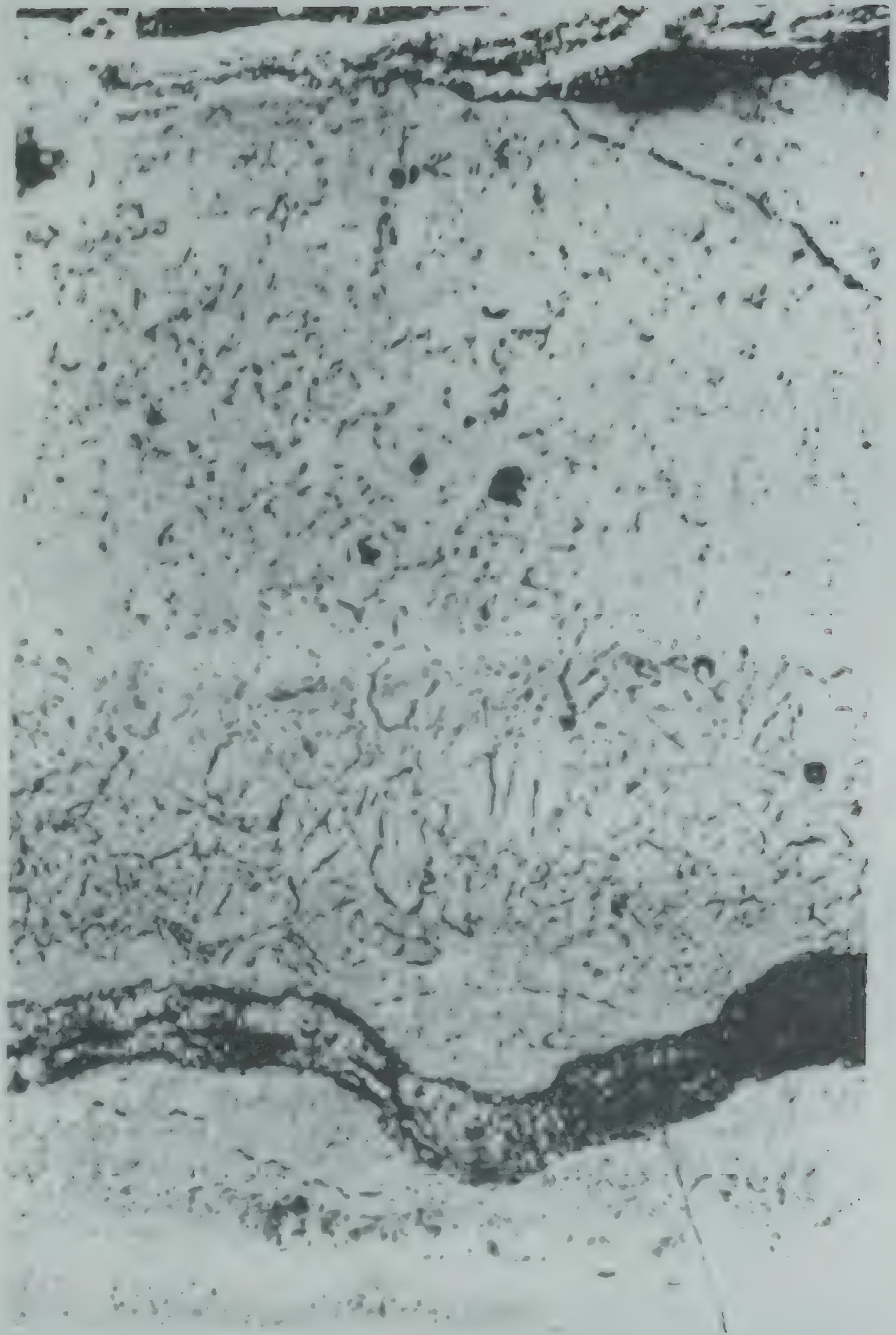
Etchant 5% Nital



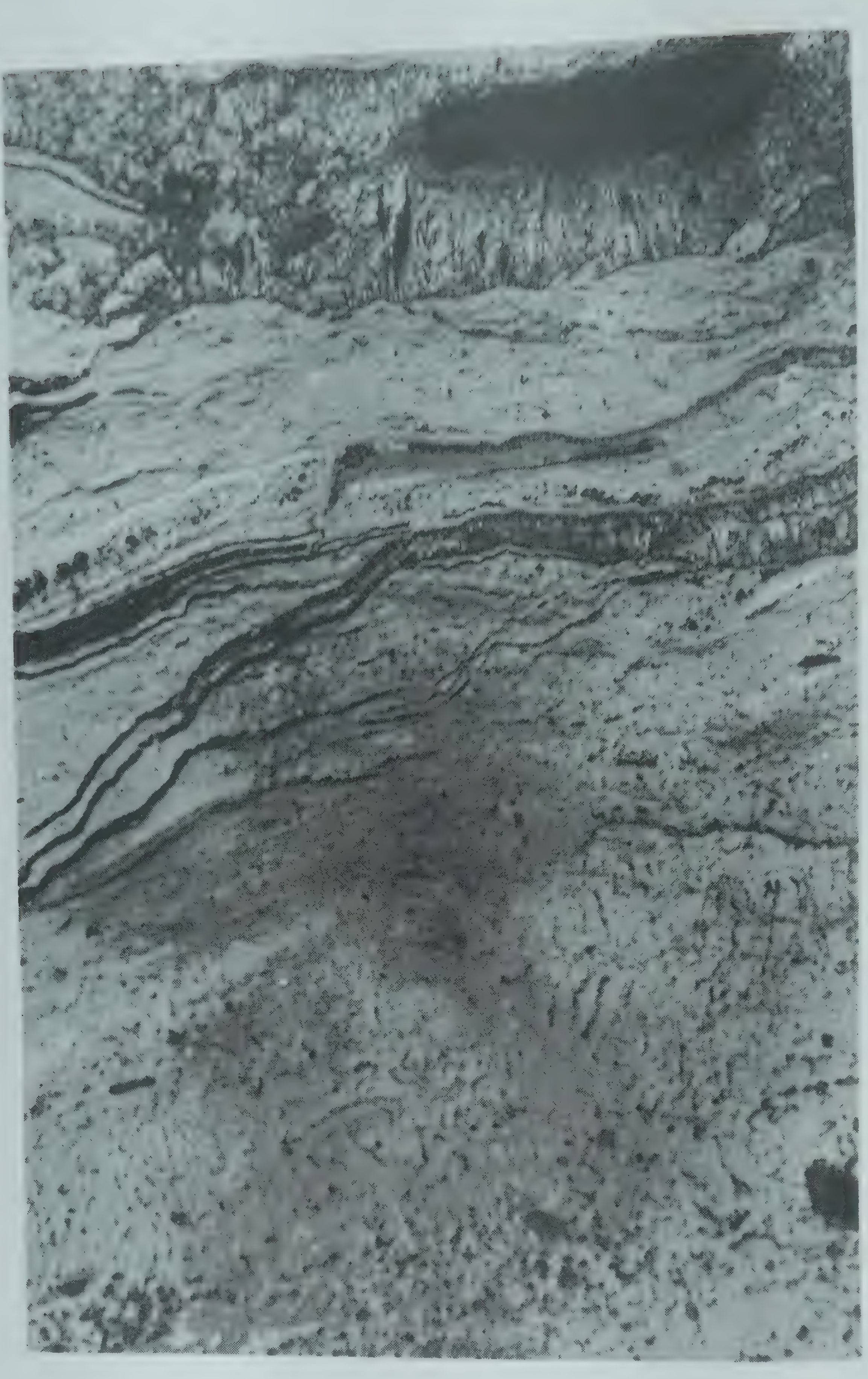
Pl. IV Microstructure revealing low carbon area alongwith high carbon tempered layer inside the section at 250x. Etchant Acid Mixture



Pl. V Microstructure revealing high carbon tempered layers alongwith low carbon area and black elongated slag inclusions at 250x. Etchant Acid Mixture



Pl. VI Layers of high carbon sheets near the surface as well as inside the section at 250x. Etchant Acid Mixture



Pl. VII Microstructure of relic carbide in low carbon area along the high carbon layer at 250x. Etchant Acid Mixture

27. BLACK-AND-RED WARE PHASE AT ATRANJIKHERA AND ITS IMPLICATIONS FOR SOUTH INDIA

- R. C. Gaur

Black-and-red ware complex representing a distinct culture was found for the first time below the PGW deposit in the Upper Doab region at Atranjikhera (Gaur, 1983; pp. 76-121) on Kalinadi, a tributary of Ganga, in Dist. Etah of U.P. in the year 1964. It was indeed a significant find which was subsequently noticed at Jakhera (Sahi, 1978; pp. 101-103) in the same District a few kilometers away upstream, at Noh (Agrawal, 1981; pp. 59-62) in Dist. Bharatpur and at Jodhpura (Agrawal, 1981; pp. 59-62) in District Jaipur-both in Rajasthan, during the course of excavations. Though the Black-and-red ware at these sites is plain, many shapes do show affinity with those found at Ahar and Gilund (Fig. I & II). It appears that sometime within the time span of period IC of Ahar, most probably in the middle of 15th century B.C., the black-and-red ware using people moved out from the Banas region along the course of Chambal and after crossing Yamuna, reached Atranjikhera. From there they moved westward into eastern Rajasthan and Punjab.

Significantly the Black-and red ware (B & RW), having affinity with Ahar, has also been discovered as far as southern Deccan. At Tekkalakota (Nagaraja Rao & Malhotra, 1965) in District Bellary of Karnataka this ware appears in the Chalcolithic horizon (Phase II) exclusively associated with burials. On the basis of cultural equipment, two phases : I & II have been marked here and it is the latter which has yielded the B & RW. While phase I has been dated to C. 1800 B.C. (Nagaraja Rao & Malhotra, 1965) as a result of C^{14} determinations, the contemporaneous Utnur (Allchin, 1961) evidence takes back phase II to C. 1400 B.C. Interestingly a bowl of B & RW having white vertical strokes in the interior showed association with groups of six strokes on similar ware with an extended chalcolithic burial at Tekwada (IAR, 1956-57; p. 18) in District Jalgaon of Maharashtra. Thus this ware at once shows a link with that found at Gilund (IAR, 1959-60; p. 41), Ahar, Navdatoli (Sankalia, 1961-62), Prakash (Thapar, 1957; pp. 4-142) etc. Both at Prakash and Atranjikhera one sherd with white painting like that of Ahar was found at each site. The discovery of white painted B & RW at Prakash in the Chalcolithic context and at Atranjikhera in pre-PGW level obviously assumes significance.

It is noteworthy that the B & RW at Tekkalakota as well as Atranjikhera is almost contemporaneous and it seems that the B & RW traditions moved both northward and southward from its epi-centre in the Banas Valley. However, it started moving southward much earlier than northward. The B & RW tradition reached Navdatoli, Prakash and Chandoli (Deo & Ansari, 1965; p. 20) almost simultaneously in around C. 1600 BC. The ceramic traditions of Chalcolithic Prakash and Navdatoli and Copper Age Ahar have common affinity and are contemporaneous. It appears that for about two centuries this ware could not make any significant movement further south beyond Maharashtra. As stated above the B & RW emerged at Tekkalakota in north Karnataka in about 1400 B.C. which is almost the terminal date (1440 B.C.) of the Chalcolithic Chandoli, a site situated at a distance of about 64 kms. north-east of Pune. However, the B & RW using people were present both at

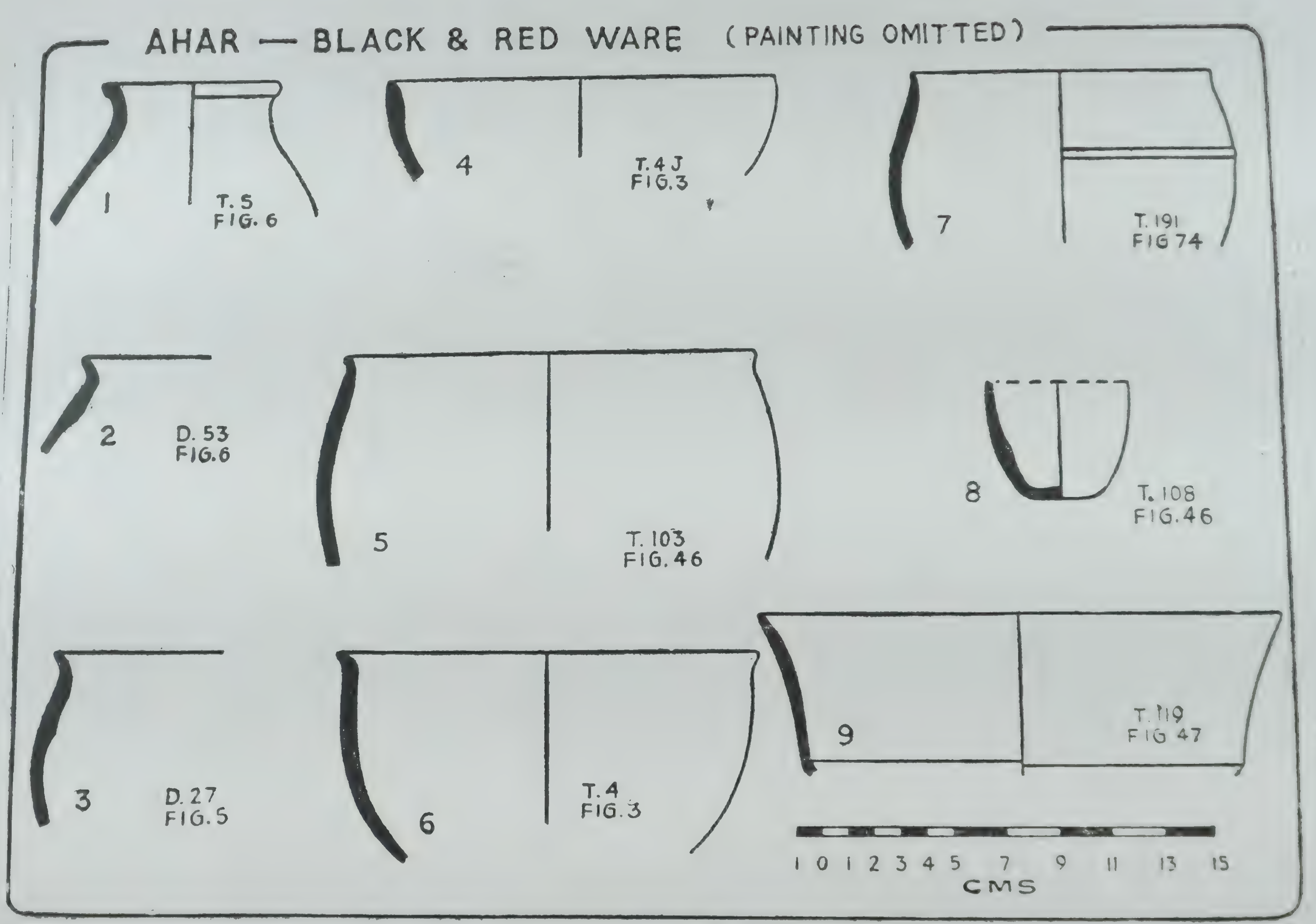

AHAR — BLACK & RED WARE (PAINTING OMITTED)

Fig. i.

ATRANJIKHERA — PERIOD II BLACK & RED WARE PHASE

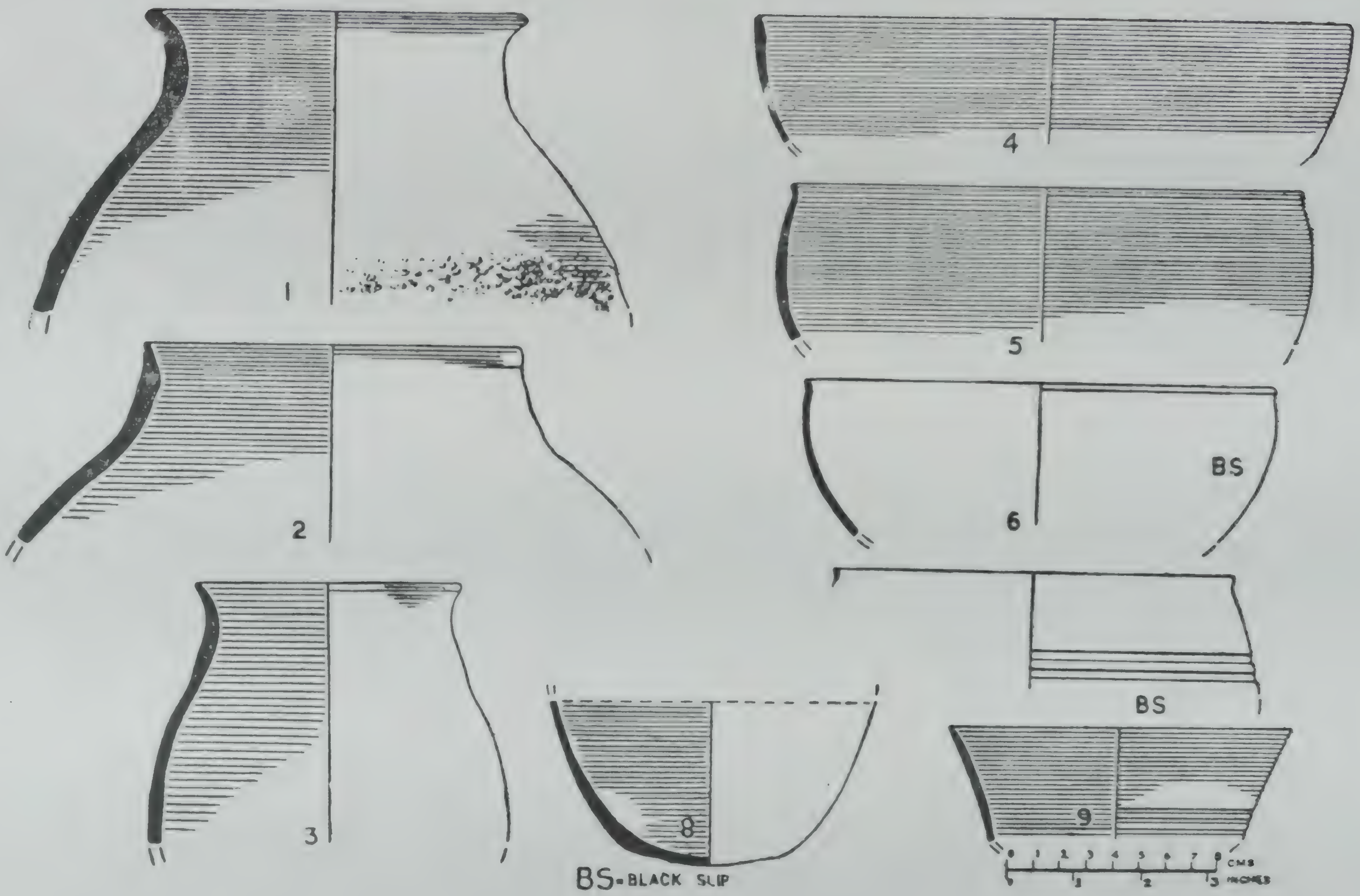


Fig. II

Atranjikhera (District Etah, U. P.) and Tekkalkota (District Bellary, Karnataka) in around 1400B.C.

Besides Ahar, another noteworthy site of this culture is Kayatha (Wakankar, 1965; pp. 49-50) (Period II) on Chhoti Kali Sindh about 24 Kms. east of Ujjain in Madhya Pradesh. Which has been placed by Ansari and Dhawalikar (Ansari & Dhawlikar, 1975) between C. 1700 - 1500 B. C. though, Wakankar (Wakankar,1965; pp. 44-50) takes it as back as 1965 B. C. on the basis of a C-14 data. The third important site of this group is Gilund situated at a distance of about 72 Kms. north-east of Udaipur in Rajasthan. The upper levels of the Chalcolithic period at Gilund seems contemporaneous with the lower levels of Navdatoli. All these sites somehow or the other were culturally linked with each other. At Atranjikhera, a few blackish sherds associated with B & RW have yellowish paintings which look similar to those found on some of the red pottery sherds of Period III of Navdatoli (Sankalia, 1958).

A comparative study of the pottery types found at Atranjikhera with that of Gilund, excavated by B. B. Lal, has shown some affinity between the two cultural deposits. Similarly some affinity has also been noticed between the cultural deposits of Atranjikhera and Ahar. However, while at all these sites the Black-and-red Pottery contains white painted marks and designs, the sherds at Atranjikhera have no painting except one tiny sherd which bears a white painted line. It may, therefore, be supposed that the plain Black-and-red Ware industry may be a later development. Plain Black-and-red ware has also been reported from eastern Punjab, and northern, and eastern Rajasthan during the course of explorations, while at Noh it is found in the same sequence as at Atranjikhera. Although bowls dominate the industry; pieces of basins and dishes have also been found occasionally.

Along with these,hand-made course B & RW has also been found which is generally black inside but brownish and black outside. The black portion is some times towards the rim, in other cases towards the base. A few pots look greyish, presumably due to faulty firing. In a few cases the upper portion is burnished while the lower is gritty and rough. Only vases in this ware have been found. The inner side of these pots has a scratched surface which seems to have been caused by scooping out the inner side with a brush of dry grass or split bamboo. These have outturned featurless rims and carinated necks. In some cases the neck is straight and thick. Those of a comparatively better quality have an outturned concave neck with incised oblique dash-marks for decoration. The body is usually oblong. These pots seems to have been burnt at a low temperature (Gaur, 1983; p. 79).

Besides B & RW and a few other associated wares of Atranjikhera which seem to have common affinity with the B & RW sites of the south including Karnataka, there are several other items which suggest that the people of this culture had their link with the south. The presence of teak (Chaudhary, 1977; p. 66) wood in the B & RW deposit at Atranjikhera is another interesting and noteworthy evidence. Before the establishment of the forest department during the British period, the northern limit of teak wood in India was the Narmada and Mahanadi on one hand and Panchmahal in Gujarat on the other. Obviously, then this timber would have reached Atranjikhera from a place where it was indigenous.

Other material objects including pottery discs, beads of carnelion, stone, shell and terracotta, burnishers, copper objects cores and flakes appear somewhat similar at B & RW sites in District Dharwad (Karnataka) and District Etah (Uttar Pradesh) though each of them has distinct regional variation.

So far fluted cores and parallel sided flakes are concerned, they seam similar both at Atranjikhera and Tekkalakota. However, the latter has yielded several microliths (Nagaraja Rao & Malhotra, 1965) where at Atranjikhera only one exceptional piece (ARJ 317/66, Pl XXII, No. 12) representing a broken blade of orthoquratzite, 1. 8 cms. long has been found. At Atranjikhere most of the cores bear multiple negative scars and the chipping is generally transverse. In a majority of cases, cortex is present either on one or both terminals.

According to geologists (Ahmad, p. 473) the pieces of chalcedony, agate and other stones found at Atranjikhera could have been brought from Ranthambhor. Since the nearest sources of copper is also not far from Ranthambhor region, it seems likely that both copper and these stones were brought from neighbourhood of Ranthambhor. However, the local sources were tapped for other sites. At least the Aravali ranges had been one of the major sources for a large number of Chalcolithic and contemporary copper Age sites.

Inspite of the fact that the deposit at Atranjikhera is thin some distinct sign of regular habitation could be noticed. Though no definite structural remains have been found at Atranjikhera, the houses were made here of wattle-and-daub as at Navdatoli and Chandoli. However, hand made bricks were also used for limited purposes. So far flora and fauna is concaved the B & RW deposit at Atranjikhera again shows affinity with that of Ahar and Navdatoli. The B & RW using people at Atranjikhera grew rice and barley (Chudhery 1977, p. 63.) while rice cultivation was known at Ahar & Navdatoli, the use of barley might have been picked up by them when they reached the Ganga Valley. It may be mentioned here that both rice and barley were known in Period I (O. C. P.) at Atranjikhera (Chaudhary, 1977, ; pp. 60-62).

In view of the basic differences between the OCP, B & RW and the PGW period at Atranjihkera, it is evident that these periods do not present an evolution of the culture of the same people. On the other hand the pottery types of Atranjikhera do show affinity with those found at Ahar, Gilund, etc. However, while at these sites B & RW industry contains white painted marks and designs, the pottery of Atranjikhera have no painting except one sherd referred to above. Even at Kasarapalli (IAR, 1961-62, pp. 1-2) in Andhra Pradesh the B & RW found in period I belonging to pre-iron deposit is exclusively plain but otherwise shows affinity with the Chalcolithic material from sites in central and western India (Sarkar, A. I. No. 28, p. 40).

Hallur (Sarma, 1967,; p. 91) period II is marked by the appearance of iron megalithic pottery.

At Atranjikhera, these B & RW using people came in contact with the iron using PGW people around 1200 B. C. (Gaur,1983 ; pp. 219-20) when the latter came to settle down there with their iron technology. In a major part of the excavated area PGW accumulation was found over the deposit of B & RW which is followed by overlapping phase in period III (PGW level) in which B & RW is in dominating position. However, the iron made its first appearance in this overlapping phase. With the result, these Black-and-red ware people, who obviously had their link with south, after being familiar with newly introduced iron technology could have transmitted its knowhow to the south which ultimately gave impetus to the manufacturing of the iron implements in north Karnataka region around 1000 B. C.

At Hallur (Nagaraja Rao, 1971; p. 31) a site situated on the left bank of the Tungabhadra in district Dharwad of Karnataka state, a plain and white painted Black-

and-red ware has been excavated in period II which has the remains of the preceding Neolithic-Chalcolithic phase on one hand and succeeding early iron phase of megaliths on the other (Wakankar, 1964; p. 149). This overlapping phase, yielding iron, has been dated 1000 B.C. (IAR, 1965-66; p. 90) The iron implements found here include arrow-heads, spear-heads and knife-heads. These items are almost similar to those found at Atranjikhera. Thus in almost two centuries the iron technology reached from north to south as far as Dharwad.

However, the recent TL dates for iron-yielding level of Komaranahalli, a site about 12 kms away from Hallur, push the antiquity of iron to 1200-1100 B.C. in Karnataka. Thus apparently it appears that iron appeared almost simultaneously both in south and north. However, north (the Atranjikhera evidence) still seems to have precedence over the South Indian evidence and it is just possible that within a short span of time the know-how of iron technology moved from north to south. But before arriving at any conclusion the entire evidence should be carefully examined. The possibility of independent origin both in north as well as in south cannot be ruled out.

28 THE PROBLEM OF WHITE PAINTED BLACK AND RED WARE IN TAMIL NADU—KARNATAKA

P. Narayana Babu*

Before dealing with the problem of white painted Black and red ware with its type sites in Tamil Nadu–Karnataka, a brief survey of this particular ware occurring in Chalcolithic context of Central India will serve as a background to determine its origin, development and its contact, if any, with southern regions. This was noticed in the Banas valley with the type site of Ahar belonging to the Chalcolithic culture. It was found throughout the occupational level and thus appears to have had a long life in the site. The paintings on this ware are noticed either on the exterior or interior or on both. It is also reported from Gilund not far away from Ahar in association with microliths. The other sites in Central India which had produced this ceramic ware are Eran (IAR, 1960-61 to 1963-64), Navdatoli (Sankalia, 1958), Kayatha (Ansari, 1975), Maghoti, Besnagar, Nevasa (Sankalia, 1960) and Nagda. In Maharashtra also this particular type of pottery is reported to have encountered from the sites at Chandoli, Prakash and Tekwada (IAR, 1956-57; pp. 18-19). Recently, the site in Kholaj in Dhulia district Sindhakhed taluk yielded sherds of black and red ware with paintings in white pigment on the interior and graffiti on the exterior in association with the late Harappan pottery (IAR, 1980-81; p. 40). In most of the excavated sites of the Central India and Maharashtra this ware was found to be in association with the Chalcolithic culture.

In Karnataka region, this ware was noticed in the excavations at Hallur, Tadakanahalli (IAR, 1978–79; p. 45) both in Dharwad district and Komaranahalli (IAR, 1980-81; p. 29) in Chitradurga district. At Hallur it is encountered in the overlap phase of Chalcolithic Iron Age. This ware has a highly burnished surface with their section. It is decorated with post firing white paintings. Generally the designs consist group of vertical and oblique strokes and group of six or seven lines. The paintings are pale and clearly visible only when the bright light falls on the surface area. The shapes of this ware include bowls, tulip-shaped and conical vessels (Nagaraja Rao, 1971). It is also noticed in the megalithic urn-burials at Tadakanahalli (IAR, 1978–79; pp. 45–46, fig. 7 top) and in the pit burial with cairn circle (Megalithic II) at Komaranahalli (IAR, 1980-81; p. 29) which is about 12 km. to the east of Hallur. These two sites reveal the date of white painted Black and red ware as at Hallur and indicate the contemporaneity with the overlap phase of the Chalcolithic and the early Iron Age. On the basis of which the date is assignable to circa 1000 B. C. Allchin had reported a typical shape in the form of cup in black and red ware with white paintings from the excavations at Piklihal (Allchin, 1960, p. 65). It has also been reported from the burials at Tekkalakota in Neoltihic context (Nagaraja Rao, 1969; p. 23).

The subsequent excavation at Sanganakallu confirms the occurrence of this white painted Black and red ware in the overlap phase (Nagaraja Rao, 1969). The excavator noticed the similarity while comparing the designs of the paintings on this ware with that of T Kallupatti in Tamil Nadu. Further it is reported that the white painted Black and red ware of Karnataka emerged into the scene in the overlap phase of Chalcothic–early Iron Age Culture and by its stratigraphy, it is c. 1000 B. C. at the earliest.

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* I am beholden for all the assistance rendered by my colleague Sri K. K. Ramamurthy.

In Tamil Nadu, this ware is reported from the excavations/explorations at Tirukkampuliyur (Mahalingam, 1970 ; pp. 28-32), Paravai (Gurumuthy, 1981; pp. 65-67), Korkai (Gurumurthy, 1981 ; p. 124), Tirthu (ARASI SC. 1903-04), Kancheepuram (IAR, 1969-70), Uraiyur (IAR, 1970-71) and T'Kalluppatti (IAR, 1960-61 ; p. 18). Except at Korkai and T'Kalluppatti, in all other sites this white painted Black and red ware was found in association with the Russet-coated ware and hence this ware was assigned to 3rd-2nd century B. C. The Excavtions at Korkai conducted by the Department of Archaeology, Tamil Nadu, revealed the evidence of the plain Black and Redware followed by white painted Black and red ware, all black ware etc., in lowermost levels (period I). The ware in question is of medium fabric and grey in core. The designs are restricted to the portion just below the rim. The designs include series of suspended lines or vertical dotted lines. The spouted bowls of Black and red variety reported to belong to the earliest period in this site which incidentally offers as an evidence to link this ware with the ceramics of the pre-Iron Age (Gurumurthy, 1981; pp. 122-24). The excavator dated the earliest occupational level of the site to 8th century B. C. on C^{14} dating. The type site T'Kallupatti (District Madurai, Tamil Nadu) discovered by K. V. Raman during the course of his village to village survey reported the occurrence of the white painted Black and red ware (IAR, 1960-61). Subsequently, the Survey (IAR, 1976-77) had taken up the excavation to ascertain the stratigraphical sequence of this ware. The site is located on the slopes of the Devanakurchi hill with rock shelters on its eastern slopes and urn-burials on northern slopes and habitational site in between. On the eastern slopes at a particular height a cluster of rock shelters about ten in number were noticed having the evidence of early occupational debris. The results of the limited excavations conducted at the habitational site are summarised as hereunder.

The cearmic assemblage of the habitational site may be divided into three categories based on its texture, fabric, shape etc.

1. Burnished grey ware, coarse red ware and black on red ware in association with chert blades.

2. White painted Black and red ware, plain Black and red ware and black ware.

3. Russet-coated painted ware in association with coins in upper levels.

The excavation also recorded the evidence of a few post holes indicating the house pattern in lower levels. Based on the material evidence, it is suggested that this particular site had witnessed the transitional stage from Neolithic-Chalcolithic culture to Iron Age followed by historical period. Interestingly the habitational area had not encountered with many iron objects. The occurrence of chert blades and burnished grey ware would suggest the survival of Neolithic Chalcolitaic culture which solwly merging into the Black and red ware and white painted Black and red ware traditions of the early Iron Age. To ascertain the importance or utillity of the numerous rock shelters on the slopes of the hill and to correlate with the habitational site located down below on the plains, one of the rock shelters in close proximity was tapped and the results proved to be very interesting. The digging revealed two levels of occupation, the lower one is characterised by the occurrence of hand-made pottery of dull red ware with microliths and the upper levels yielding typical Megalithic cermic evidence and beads of semi-precious stones. The material evidence once again suggest the overlap of Neolithic phase into early Iron Age. In some of the urn-burials on the northern slopes found to contain ash, human bones, vases of Black and red ware etc. The urn-burials, here are placed in the pit scooped out of the bed rock. In the pits but outside the pot certain implements were recovered such as wedge shaped dagger pieces of iron etc.

The result of the excavations proved that the habitational area and rock shelters were more or less contemporary for dating and tha urn-burials appear to be later but within the Megalithic phase. From the limited excavations carried out one may draw the following conclusions:

I. The natural rock shelters might have been the abode of the Neolithic settlers as noticed elsewhere, and

II. The occurrence of the burnished grey ware, chert blades, black on red ware and the white painted Black and red ware in the habitational area indicate an overlap phase between the Neolithic-Chalcolithic to the early Iron Age Culture.

So far this typical white paintad Black and red ware has not been reported from the regions of Andhra Pradesh and Kerala. In Karnataka region this particular ware occurred in the overlap phase of Chalcolithic-early Iron Age at Hallur and the same stratigraphy is noticed at T'Kallupatti (Tamil nadu).

This ware thus appears to have moved from the Tungabhadra valley further south in Tamil Nadu. This warrants a thorough investigation of the pattern of movement of this ware.

In Tamil Nadu there appears to be two varieties of white painted Black and red ware. One is occurring in the overlap phase with the type site at T'Kallupatti and the second in early historical context (in association with the Russet-coated painted ware) as represented at Kanchipuram, Uraiyur, Tirukampuliyur etc.

It may be presumed that in Tamil Nadu the white painted Black and red ware had an individual identity in earlier times but in later stages this ware lost its identity and merged with the Russet-coated painted traditions.

The occurrence of painted Black and red ware at Korkai in the lowest levels of occupational debris dated to 8 th century B. C. confirms and correlate the evidence of this ware at T'Kallupatti in the context as stated above.

So far in the probed sites of Tamil Nadu, where the Neolithic survivals in the Megalithic culture were noticed as at Mallapadi (district Dharmapuri; IAR, 1977-78; p. 50); Kallerimalai (district North Arcot, IAR, 1978-79 ; p. 73), and Kovalm pottal (district Madurai), this ware was not reported. But peculiarly this ware makes an appearance in the survival stages of Neolithic Culture at T'Kallupatti.

It has already been observed that there are three phases of Neolithic Culture in Tamil Nadu and phase III of the cluture is dated to c. 1800 B. C.-500 B.C. (Narasimhaiah, 1980 ; p. 90) in which case it looks quite probable that the traits of this culture continued in the transition/overlap stage of Neolithic to early Iron Age Culture.

There is yet another opinion that the white painted Black and red ware of Tamil Nadu is totally different from that of Hallur and the former had an independent origin in Tamil Nadu around 150 B. C. (Narasimhaiah, 1980; p. 205). This view may hold good for the early historical sites such as

Tirukampuliyur, Kanchipuram etc. But from the evidence of T'Kallupatti it appears that this particular ceramic ware has a reasonable early date as discussed above and its date cannot be brought down to first century B. C. The associated materials also strengthen its early appearance in Tamil Nadu.

In Karnataka this ware has been dated to c. 1000 B. C. (Nagaraja Rao, 1971). In Tamil Nadu at Korkai based on C^{14} dating this ware in association with Black and red ware (period I) is assigned to 785 B. C. (Abdul Majeed, 1984). Again the earliest date for the Black and red ware is 700 B.C. as evidenced at Sengamedu (Banerjee, 1966). On this basis the date of this ware in Tamil Nadu may be assigned to 700 B. C. if not earlier.

29. ROCK PAINTINGS IN MALLAPUR, GANGAVATI TALUK, RAICHUR DISTRICT

R. M. Shadakshariah

I am indeed very glad to participate and present my paper on "Rock Paintings in Mallapur, Gangavati taluk," Raichur dist. in this rare type of National Seminar under the Centenary Celebrations of the Directorate of Archaeology and Museums in Karnataka, Government of Karnataka, Mysore.

During a mini archaeological expedition in Karnataka in the month of June 85 an important treasury of rock painting site was discovered unexpectedly by a team of three archaeologists comprising of myself, Dr. E. O. Tillner & Miss Brigette from Switzerland. Keeping an idea of seeing the one known painted unusual human figure of proto-historic period located nearby Mallapur area we had gone there with the kind suggestion and direction of Prof. A. Sundara. Fortunately our prolonged discussion with the people of Mallapur have lead us to notice this site. We therefore are grateful to the people of Mallapur and particularly to Prof. Sundara whose first guidance had lead us to unearth this unknown treasure of more than a dozen rock paintings in a rock shelter in the hilly plateau area of the locality.

South-west about 2 kms away on the way to Hire-Benkal via Aravattige from Mallapur, in Gangavati taluk., Raichur dist. is a rock painting site on the commandable hilly area. More than a dozen painting figures are depicted on a huge flat surface of the ceiling of a rock shelter which is locally called "Khanasahebanagavi". The area is covered with numerous rock boulders and small shrubs and trees of accacia bikki etc. About ¼ km away at the lower level from the shelter are several streams which originate from the hillocks and join the river Tungabhadra. The shelter having the figures on the ceiling of the granite huge boulder is by the side of steep rocks on the top of the hill. The canopy of the shelter is stretched largely towards north, north-west, and west. The shelter measures 9.00 Mts in length and 18.00 Mts in breadth and facing towards north-west. The floor is wide and very spacious. It is opened by three entrances. The main entrance is facing towards north-west the others are on the west and south. The latters are very narrow, and one can go up from the second entrance. A group of orthostats are heaped at a corner, some small boulders hapazardly lying near the second entrance and heap of soil deposited towards the third narrow entrance are inside the natural rock cave or cavern or shelter. The floor at the front side is flat surface of the natural rock. The soil of the floor is slightly ashy grey admixtured with the gravel at the back. The gravel-soil portion is partially disturbed by the local people. And this commanding view from the top of the hilly area is quite strategic and convenient for camping.

Two microliths such as parallel sided blade and crescent were found in the shelter itself. They are made on jasper and agate. And no other remains are found in this area.

The hilly plateau of Hire-Benkal area opposite to the shelter is about 2kms away. North-west about a km away is another hill with protohistoric remains in several natural shelters in which some paintings, have been noticed. Besides within the proximity of them on the top of hillock have been brought fo light by Prof. Sundara earlier. Within the proximity of the rock painting site which we noticed a painted human figure (4.00 Mts) was noticed by tha same scholar earlier.

In the hilly plateau of Hire-Benkal area large number of megaliths and several rock painting sites have been brought to light by several scholars such as Leonard Munn (1935 ; pp. 225-250), D.H. Gordon (1951 ; pp. 117-119) and Prof. Sundara (1968 ; p. 67, 1974 ; pp, 21-32) since 1940's. In other parts of north Karnataka area in the districts of Chitradurga, Bellary, Raichur, Bijapur, Dharwad and Gulbarga numerous rock art sites both rock engravings/bruisings and rock paintings were noticed by Bruce Foote (1916; pp. 87-89), F. R. Allchin; K. Paddayya (1968 ; pp 294-98) ; Dr. M. S. Nagaraja Rao, Dr. Wakankar ; 1973 ; pp. 280-282), Dr. Yashodhar Mathpal (1980 ; p. 23) etc. since the end of last century. Among them the field work and the study of Prof. Sundara in this respect is indeed highly extensive in north Karnataka.

The figures are executed with red colour. The colour material may be of red oxide or cryan. The figures are animals either wild domesticted or aquatic creatures and human both male and female. Three groups of figures may be distinguished. The average distance between each group is about 2 to 3 meters. Most of the figures are partly or fully filled with geometrical decorations such as curvilinear parallel lines or criss-cross lines, or both and often with horizontal short strokes and dot marks within parallel lines as well as inverted 'V'shape marks. The figures are, Men (3) Couples (2), Boars (1), White Beers (4), Stag (?) (1), Buffalo(1) fish (1), snake (1) and some complicated species.

Their characteristic features of the style, theme and relative study etc., are briefly discussed below in this preliminary work.

1. Human Figures

A. Male

On the southern entrance of the shelter is a male figure (2. 20 meters). The pose of the right leg is not fully visible. A part of the head is overlapped by the leg of another human figure. The hands are raised up, the legs are stretched on either side and bolded up, which obviously suggesting that he is lying down. The head is in triangular shape and without neck. At the bottom and in the middle of the thorax is shown cylindrical and elongated male organ, is noteworthy. It has no fingers either for the legs or for the hands. The thorax part is filled with 'V' shape mark, criss-cross prominent design and elongated parallel lines are shown in the legs. The purpose of representing this pose is enigmatic. However, the figure may be comparable to that of Ramadurga.

b. Another male figure (2.00 meters) is at the opposite side of the above mentioned figure. The depiction is not bold and heavily faded. He is in standing pose. The head is in oval shape and having rays of four hairs on the head, is a special feature. It appears that the eyes are shown on the face. The body is in rectangular and filled with criss-cross design in the thorax vertical parallel lines in the legs. The pattern of decoration is similar to that of the above mentioned figure. The hands are also raised. It may be a symbolic representation of a Super-man or Priest or Sun-god (?). Interestingly the right hand having six fingers but not shown the fingers for the other hand and legs.

c. The last male figure (3.20 meters) is near the margin at the northern face. He is also in standing and the pose of the legs looking like inverted 'V'- shape. The hands are raised up the pattern looks like 'U'-shape. The pose of the raising hands is

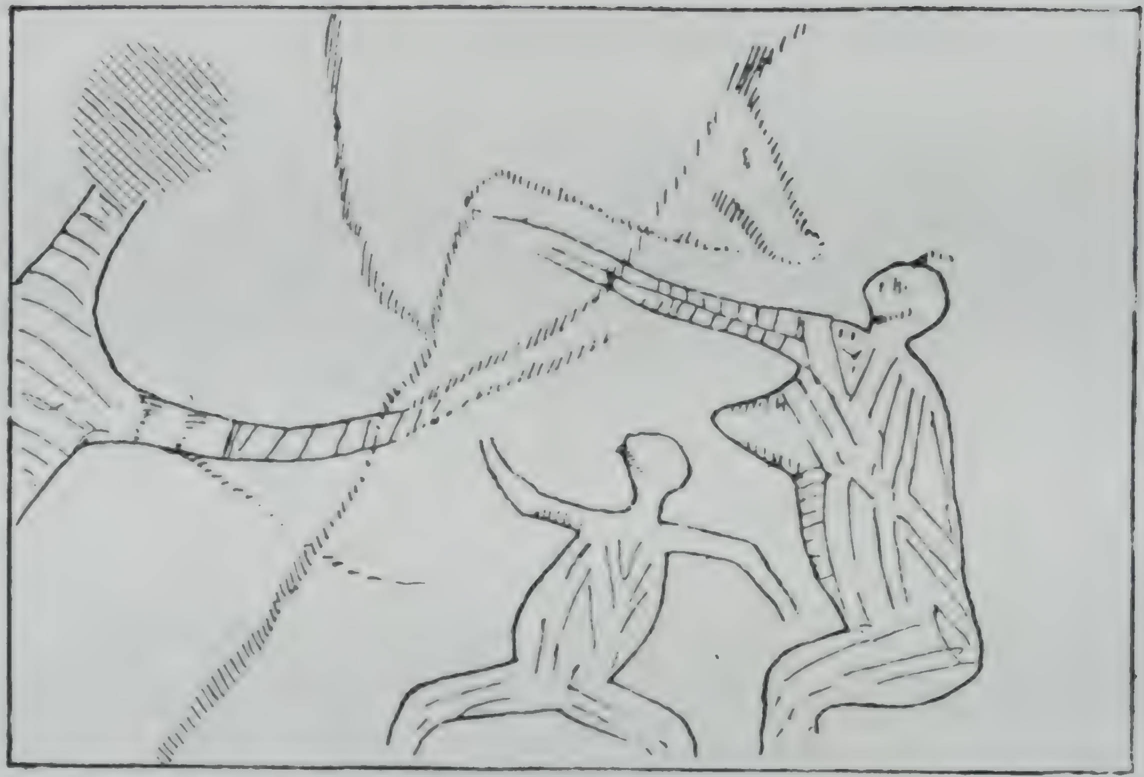

Fig. I. A group of overlapping figures, Mallapur

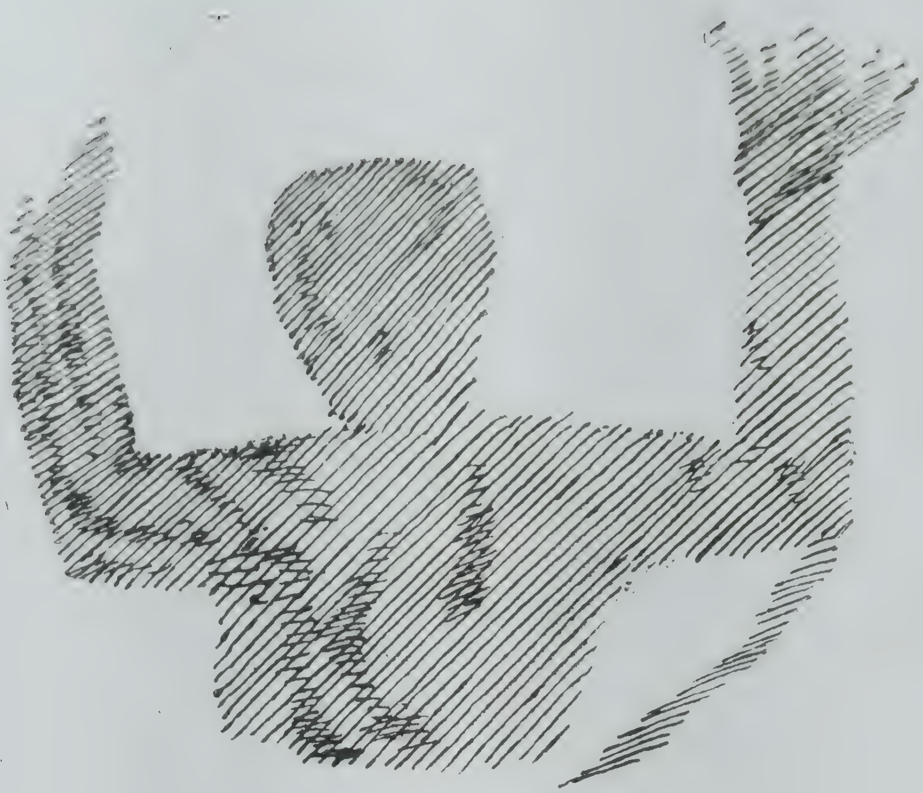

Fig. II. Biggest male figure, Mallapur

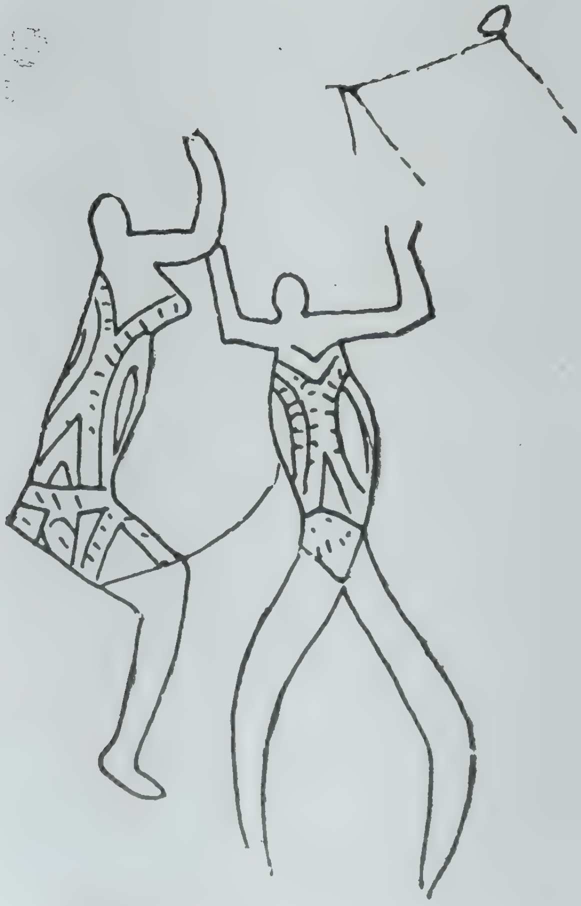

Fig. III. Seated figure, Mallapur

similar to the above mentioned figure no. Ia. The head is in triangular shape and the thorax is in rectangular form. The whole body including the face is executed with geometric decorations such as criss-cross parallel line, 'V'- shape mark etc. The fingers are depicted in triangular form for both the hands. It is oriented in east-west direction on the ceiling. The figure is the biggest one in the complex and may be second in Karnataka rock art ?

2. Couples (Male & Female)

a) A couple of man (0.7 Mts.) and woman (0.68 Mts.) figures is depicted near the above mentioned figure no. 1a. They are closely associated with each other. A part of the figures is overlapped by the back profile line of an animal body which having oblique parallel lines representing hairs on the body. The heads of the couple are in oval shape with short narrow necks. The man is standing opposite the woman and he holds the leg of the woman tightly (?). The legs are elongated and look like an invertedl 'U'-shape. The woman is seated on a smal oval shape pillow. The part of the right leg pose is shown suggesting that she is definitely in seated pose. The thorax of the man is in elliptical shape. The geometric decorations are executed at the thorax and the hip for both. The breast of the woman is quite naturalistic, is noteworthy. Their feet without fingers are dipicted. Probably this scene appears that the man is either demanding or forcing her consent for sexual intercourse (?).

b) The other couple of man (1.35 meters) and woman (1.95 meters) is prominent and boldly depicted. They are closely associated one near the other. This highly realistic figure is near the narrow opening of the second entrance of the shelter. In the scene the woman figure is bigger than the man figure. The body of the woman is kneeling i.e. bent forward and the hand is stretched up horizontally and also the leg is slightly bent towards backward. Both the legs are shown in one leg but single hand is depicted. The man has placed his left leg on the woman, is a peculiar feature and the other leg is free. The left hand is free with four fingers and the right hand is raised up. The fingers are not shown to other hands of the couple besides the legs. Their heads are in oval shape. The pose of the mouth looks like monkey of male figure. The woman has a tuft on the head. Their body of the head, face, thorax and the legs, is executaed with curvilinear parallel lines, horizontal short lines, dots, vertical elongated criss-cross lines, parallel elongated lines. The designs are similar to that of the above mentioned couple. The decoration is made on the head and hands of the man figure but made on the head of woman figure. The thorax of the man figure is in elliptical shape and the female in rectangular form. The breast is quite prominent. The heavy decoration is shown on the hip of woman figure.

The style and decoration of the woman figure is slightly similar to that of the woman figure of Hampi paintings which were recently discovered by the Directorate of Archaeology and Meusums in Karnataka, Govt. of Karnataka, Mysore. The kneeling body of the woman and decoration is slightly similar to that of Joara (Erwin Neumayar; 1983, pp. 91-94) etc. Another peculiar feature is an antler hilt like stick pierced at the back of the of the woman figure.

3. Animals

a. Boars

The figure of a Boar is near the above mentioned first couple figure. Unfortunately the details are not clearly visible. On the back of drum shape body has oblique parallel

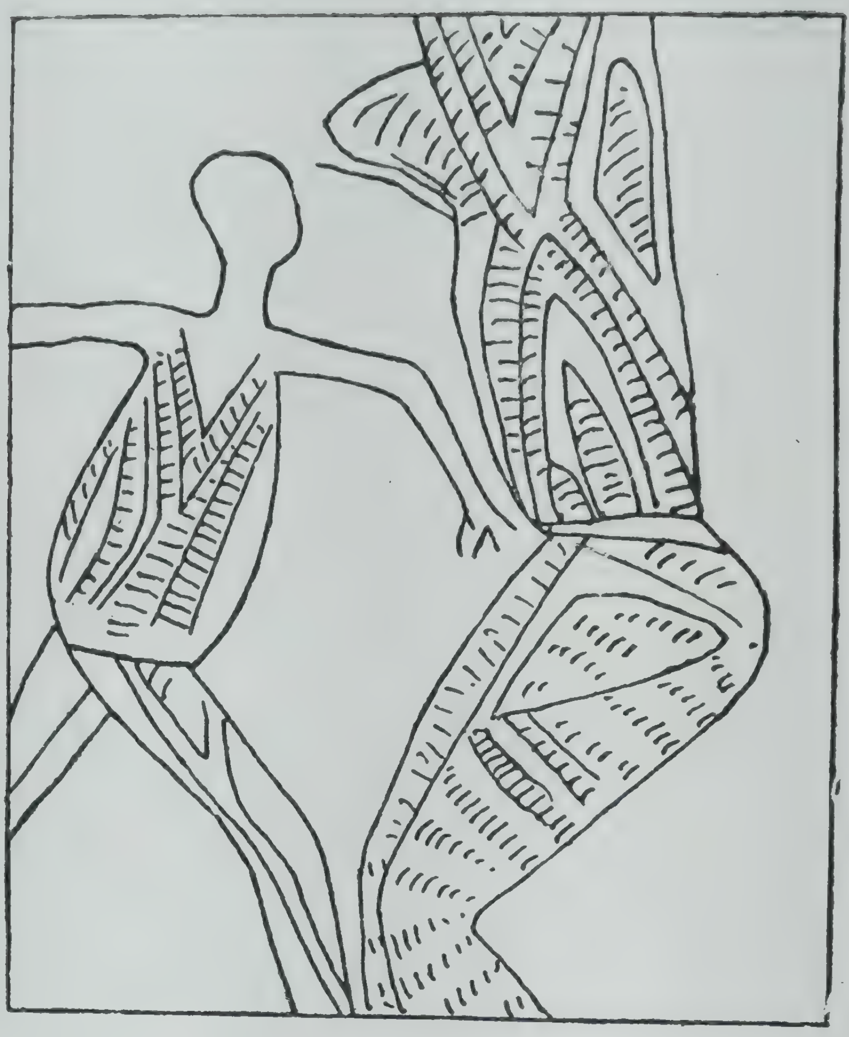

Fig. IV. Standing couple figure

lines representing the hairs. The back is depicted over the first couple figures.

b. Deers

There are four white deers depicted by the side of second couple figure. The weavy lines are shown in the body. They have snout, mouth and rectangular body. They are not boldy depicted. A few of them are not boldy depicted. A few of them are similar to that of Appayyanahalli (1984), etc.

c. Buffalo

The figure of the Buffalo (3.50 meters) is near the above mentioned male figure no 1c. The depiction is dim. It is in standing profile. The head part is not clearly visible. It has four legs and drum shape rectangular body with a tail at the rare side. The body is executed with heavy geometric decoration. Interestingly a dwarf man is holding the hind leg of the animal. The purpose of holding the leg by a dwarf is yet to be known.

d. Stag (0.90 meters)

The figure probably of Stag is shown near the first entrance. The figure is quite composite one. A twig of the tree is shown on the head instead of the horns of the stag. It is indeed a peculiar animal among the animals in the complex.

e. Fish

An aquatic animal i.e. fish is shown between the composite animal and the male figure no. 1c as mentioned above. The figure is in oval shape and has many elliptical parallel lines. It has fins at the sides, and nostril at the front. The painting is of course very dim. Therefore, the other parts are invisible.

f. Snake (3 30 meters)

An elongated and cylindrical figure of snake is at the rare side of the Buffalo figure mentioned above. It has wavy form with heavy geometrical decorations in the body.

There are also some composite figures within this complex. And they are not clearly visible.

General Observations

In the complex the male figure (or women) is closely associated with the, female, in both the couples scene. The style and decoration of both are closely similar. The second couple scene is indeed realistic. The man placing his leg on the leg of woman is an unusual feature. The breasts are prominently depicted in the complex. The figures, especially the human paintings, show two types of heads, one is oval and the other is triangular in shape with heavy decorations shown for the triangular head male figures. Whereas the oval shape head of the male figures are shown with elliptical thorax, but rectangular thorax is shown to the triangular head male figures, which suggests probably two different periods. Besides, the geometric decorations of the oval shape heads of the human figures are in contrast to the triangular heads figure in the complex. Therefore they may have been depicted in two different periods ?

The leg of male figure is depicted over the head of another male figure no 1a It indicates that the male the figure no. 1a is earlier than the other. Besides the first couple figure is overlapped by an animal figure. Obviously the couple figure is earlier than the animal figure. The style and the type of the heads and thorax of both the couple figures are almost similar. But style and decoration are not similar to the other human or animal figures. All the figures are directly depicted on the bare ceiling of the rock boulder and use a single colour i.e. red. But among the group the shade of the red colour of the couples figure is more transparent particularly the second couple figure is highy trans parent.

The occurrence of microliths within the rock painting shelter and the existence of proto-historic rock painting sites with or without the ancient habitation sites of proto historic periods besides megaliths situated within a circumference of 2 to 4 kms. It is likely that they appear to be of the proto-historic periods (c. 1800-200 B.C.) Some of the human figures are similar to those of Hampi, Ramadurga, (Information from Dr. A. Sundara) Joara (Erwin : 1983, pp. 91-94) of the proto-historic periods. And the style, decoration of animal figures such as deer, boars may be similar to those of the proto-historic period pobably of megalithic period. Therefore it is quite likely that the human figures particularly couples appear to be of the chalcolithic ?, the other human figures may be of overlapped phase i. e. neolithic-chalcolithic and megalithic and lastly the animals may be of the megalithic period. Although it is necessary to study them thoroughly for fixing exact periods. On the preliminary study of my work the probable periods are fixed.

30 ROCK PAINTINGS IN HAMPI : SOME ASPECTS

A. Sundara

Preliminary Remarks

Although discovery of rock bruisings in Sanganakallu-Kupgal area by Hubert Knox was as far back as 1872 (Bruce Foote, 1916 : pp.87–89.)it was only as late as 1935 Leonard Munn was the first to report about three rock paintings in Hire-Benkal granite hill ranges (Gangavati Taluka) as also rock-bruisings and engravings in Billamarayanagudda near Lingasugur, a Taluka head-quarters both in Raichur Dist. He briefly described them in the Annual Reports of the Department of Archaeology of the former Hyderabad State (1934-35, Appendix D). Since then sporadically in natural boulder caves and rock shelters, are noticed paintings, for instance, at Togalgudda (near Atnur not far away from Raichur), Balachakra (Yadgir Tk. Gulburga Dist.) and in the recent years in Tekkalakota (Nagaraja Rao, 1965 : pp 97-99) a few more paintings in Hire-Benkal, Sanganakallu, Kurugod etc. (Sundara, 1974-1984 : pp. 137-148 and 1987; pp. 1-13)

However, no systematic intensive survey of such rock paintings in North Karnataka area has been carried out or undertaken like the explorations and study in the Bhimbetka and other areas in Madhya Pradesh and Uttara Pradesh etc., profusely rich in rock paintings. From 1974 I took up a small project with the UGC financial assistance of preparing a monograph on *Rock Art in North Karnataka* including rock bruisings and engravings.

In pursuance of this project I surveyed the known localities with rock paintings/bruisings and by the way discovered a few more localities with rock art for instance Badami, Hosa-Mahakuta, Aihole (Bijapur Dist.), some more in Hire-Benkal, Mallapura, Anegondi, Timmalapura, Narayanapura, Bandiharlapura (all in Gangavati Tk,). Manvi, Bailamarched (Manvi Tk.) etc. A monograph is prepared on these findings and the illustrations are being finalised for it.

ROCK PAINTINGS IN HAMPI

From about 1976 onwards the Archaeological Survey of India, Government of India and the State Directorate of Archaeology and Museums, Govt. of Karnataka, while continuously carrying out explorations of inscriptions, other cultural relics; excavations of structural remains buried under their fallen debris and conservation of numerous dilapidated monuments scattered in several hundreds in Hampi, the single largest medieval capital city of Vijayanagara Empire in South India, have noticed also few rock shelters with paintings. I have tried below to discuss some noteworthy aspects of some of these paintings which range in date perhaps from Neolithic in the Chalcolithic Stage (c. 2000-800 B. C.) to the beginning of the early Historical period (Circa 3rd cent. B. C. onwards) in Hampi.

Localities with Rock paintings

In Hampi in the following places are noticed rock shelters with paintings :

1. A rock shelter near "Sugriva Guha", close to the river Tungabhadra.
2. Mosalaiahana Gudda, North-East of the "Vijaya Vitthala Temple".
3. West of "Hemakuta group" of temples outside the enclosure.
4. Near the junction of the "Virupaksha Temple" and the Kadirampura roads, a little more than a km from behind the "Virupaksha Temple".
5. Further away from the locality No. 4 near "Baramadevara gundu".
6. Behind "Raghunatha Temple" on the Malyavanta hill.

Among the paintings, those near Malyavanta Raghunatha Temple in style and technique appear to be of a late historical period. They are therefore here not considered.

It should also be noted here that the paintings on a large boulder on Mosalaiahnagudda command the view of an ancient site with Neolithic (in Chalcolithic stage)-Iron Age Megalithic Early Historical cultural remains. The rock paintings near "Sugriva Guha" and the Mosalaiahana gudda as well as the site near the latter, were noticed by the Archaeological Survey of India and the others by the State Directorate of Archaeology and Museums. The paintings are now discussed below one by one.

The Paintings : Some general features.

The paintings as a whole variously belong to a few cultural periods : Neolithic (in the chalcolithic stage)-Iron Age Megalithic to the Late Medieval – Modern. As found elsewhere and already known, these paintings are executed directly on the rough, uneven, granular or somewhat nice broad surface of granite boulders generally on the rear side or on the top of caves or shelters, in red ochre as well as white lime. The figures are in varying shades of colours bright or dull. In some spots they are partially worn out or illegible. The figures drawn are humans, animals and designs in varieties in varying proportions, in silhouttee or outline. The style, the character, and the composition of the groups vary from period to period.

As discussed by me (1987; pp. I-31) elsewhere, Gangavati–Hospet area relatively has the largest number of localities with rock paintings and appears to be the focal area of this art activity, mostly by the pre-historic people. In view of the discoveries, it appears that this region is highly potential and what is known is just a small fragment of a very large number yet to be explored and studied. It may also be noted here that there are in the area numerous ancient sites with cultural material remains of the Neolithic in the Chalcolithic stage, numerous Iron Age Megalithic sites with very large number of megalithic tombs, and early historical sites (Sundara, 1975; pp. 13-77). There are also a few sites with ash mounds, for instance Hire–Benkal (p. 73). etc., Hampi forms a part of this important cultural area. Near the bank of the Tungabhadra close to Anegondi was an ash mound in Nimbapura (Bruce Foote; 1916 : p. 93). About 2-3 km. away from this site is another ash mound locally known as "Valikashtha"or "Validibba" (IAR, 1961-62; p. 102) i. e. the cremation spot of Vali the celebrated Vanara chief of the *Ramayana*, brother to Sugriva, killed by Rama. It is appropriate to know that there are at least two rock shelters with paintings overlooking this traditionally celebrated mound. It is against this background and in relation to these findings the significance of the rock paintings are discussed. However a thorough mapping of these would give better and clear idea of these paintings. This is yet to be done.

1. The paintings near Sugriva Guha (Pl. I, Fig. I)

A few metres behind the "Sugriva Guha" in a small range of bouldery hills close to the Tungabhadra in a cave are the paintings. They are on the vertical surface of the rear boulder of the cave. In these paintings are roughly from left to right : a geometrical triangular design at the top looking like an iron arrow-head of the Protohistoric Iron Age Culture of the lower Deccan, a series of roughly parallel lines partially worn out a human, a crocodile (?), a part of a boat including the stern, a pair of eyes with mid-line (of an owl ?), at varying levels scattered over an area of about 4m x 3m. The arrow in silhouttee is in oblique position.

The Humans

At least one human figure is distinctly visible. The figure with small head, narrow chest, rather bulgeous stomach partially in side profile is in outline. On the trunk is painted geometrical design. The right hand is partially lifted up. The left hand, appears to have been let down freely not clear as it seems to merge with the painted body in profile. The legs are hardly visible. The design on the body consists of double lined bands with parallel strokes across between the lines. Near the feet is what looks like a crocodile in outline. A little away from this creature is another figure rather difficult to identify. It appears to be part of a dug out wooden boat. At the right end of this figure and above, is what looks like a pair of eyes with a vertical line between them, reminding an owl.

In particular, the arrow head like figure in silhouttee has a spike like projection at rear end corners. It seems to represent rather advanced type.

There is a line of illegible writing in white lime between the person's head and the extreme tip of the boat (?). In fact the last two letters overlie the tip. This painting is within a short distance from Mosalaiahana gudda.

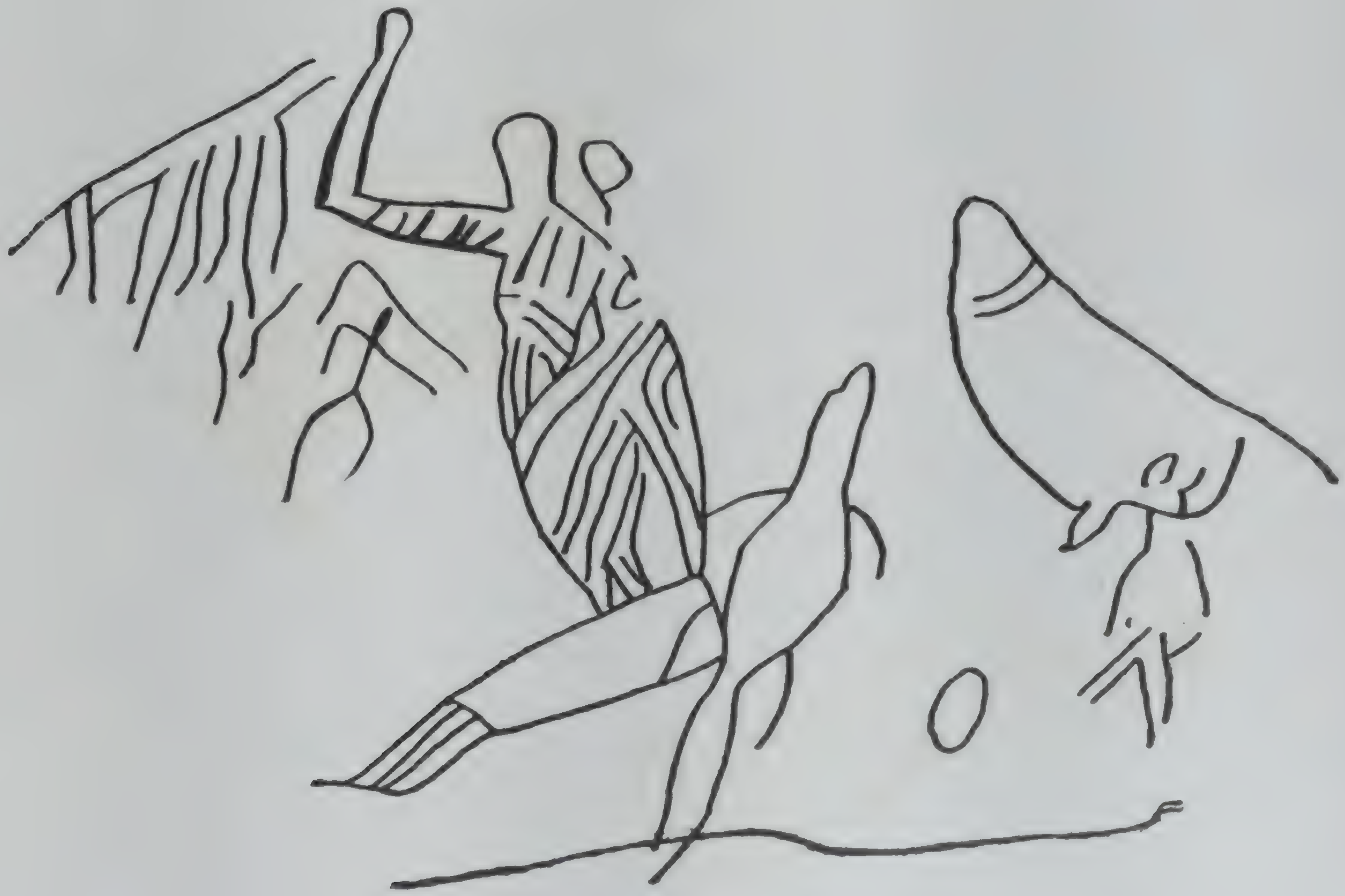

Fig. 1. Paintings in a cave near "Sugriva Guha" (Human, crocodile etc.) Close to the river Tungabhadra.

2. The Paintings in Mosalaiahana Gudda (Pl. II, Fig. II)

Actually the locality is an open field surrounded by the castellated bouldery hillrange about a km. North-East of "Vijaya Vithala Temple". And it is on the vertical surface of one of the grotesque boulders overlooking the site, are three individual paintings a bull, a tiger and an unidentified figure. They are directly exposed to the open atmosphere. They are therefore rather obscure. However the bull is comparatively distinct.

The bull is robust but with rather thin limbs. The V. shaped horns are fairly symmetrical. The hump is prominent.

The bull is in silhouttee and the tiger necessarily in the outline since the stripes on the body a distinctive feature of the animal cannot be brought out if the monochrome figure is in silhouttee.

As mentioned above at the foot of these boulders in the open field is the ancient site with the Neolithic (in Chalcolithic stage), Iron Age Megalithic and early historical cultural remains (charaterised by russet coated white painted pottery also).

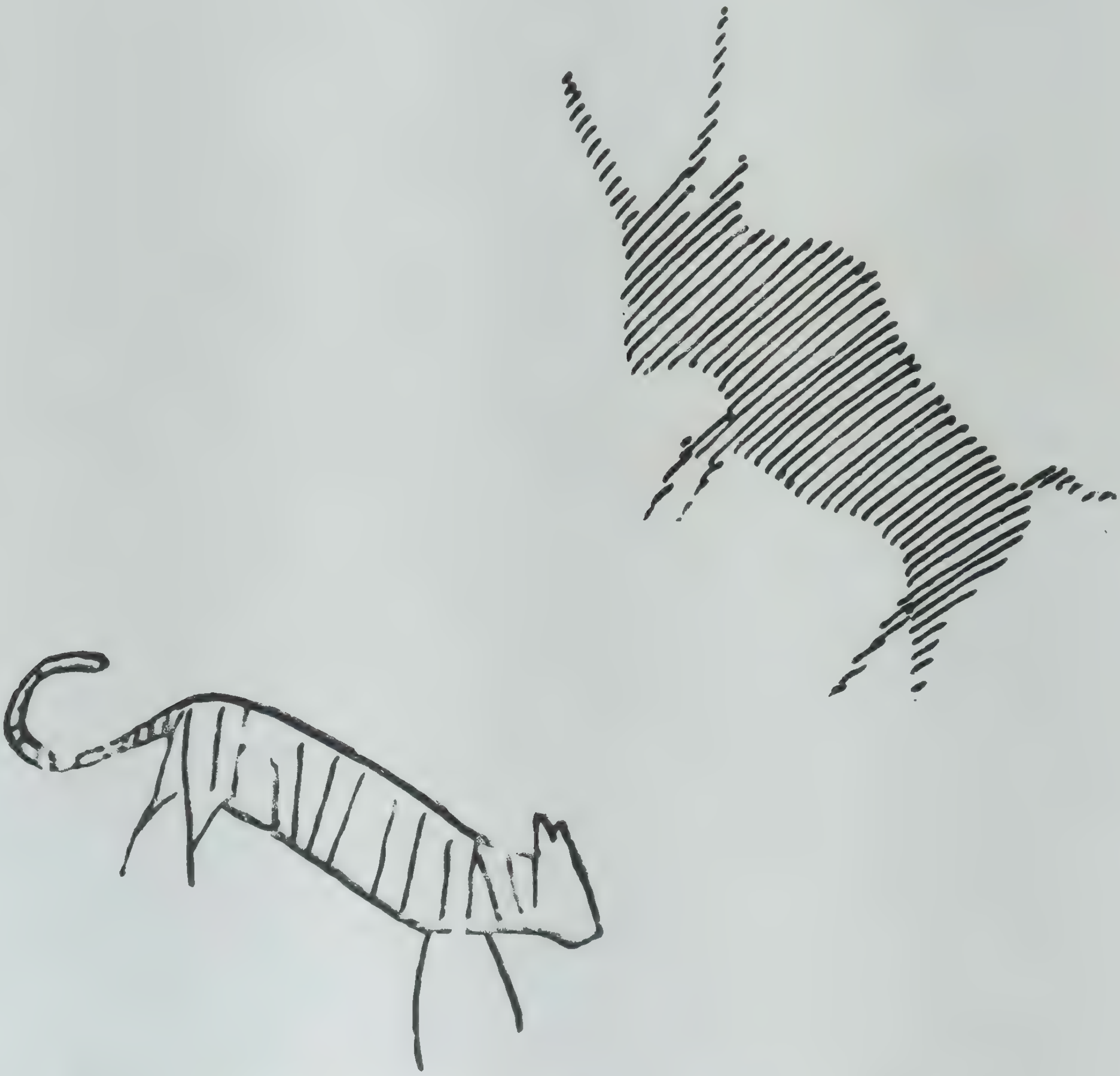

Fig. II. Paintings on a boulder in Mosalaihana gudda (Bull, Tiger)

3. The Paintings near Hemakuta temple group (Pl. III, Fig. III)

With a large group of Saiva temples within an enclosure on the southern side of the celebrated "Virupaksa temple", this elevated rocky area has the commanding view of the river Tungabhadra below. Here at two spots near Kannada inscriptions, are paintings. In one spot is a figure of a fish in outline somewhat realistic. It is long, broad in the middle probably indicating a particular variety. The body is divided into three segments rather bulgeous trunk and rapidly thinning tail part in two segments with a broad partially V-shaped tail end. On the trunk is double lined design of the type of Roman letter "X" and on the tail part are horizontal parallel lines. The anatomical features are fairly proportionate.

Nearby in another spot is fish motif in outline short in stature with parallel horizontal lines on the body. The trunk is strikingly bulgeous. The tail part is obscure. These two motifs anatomically are not alike and seem to represent two varieties, probably existing then in the river nearby.

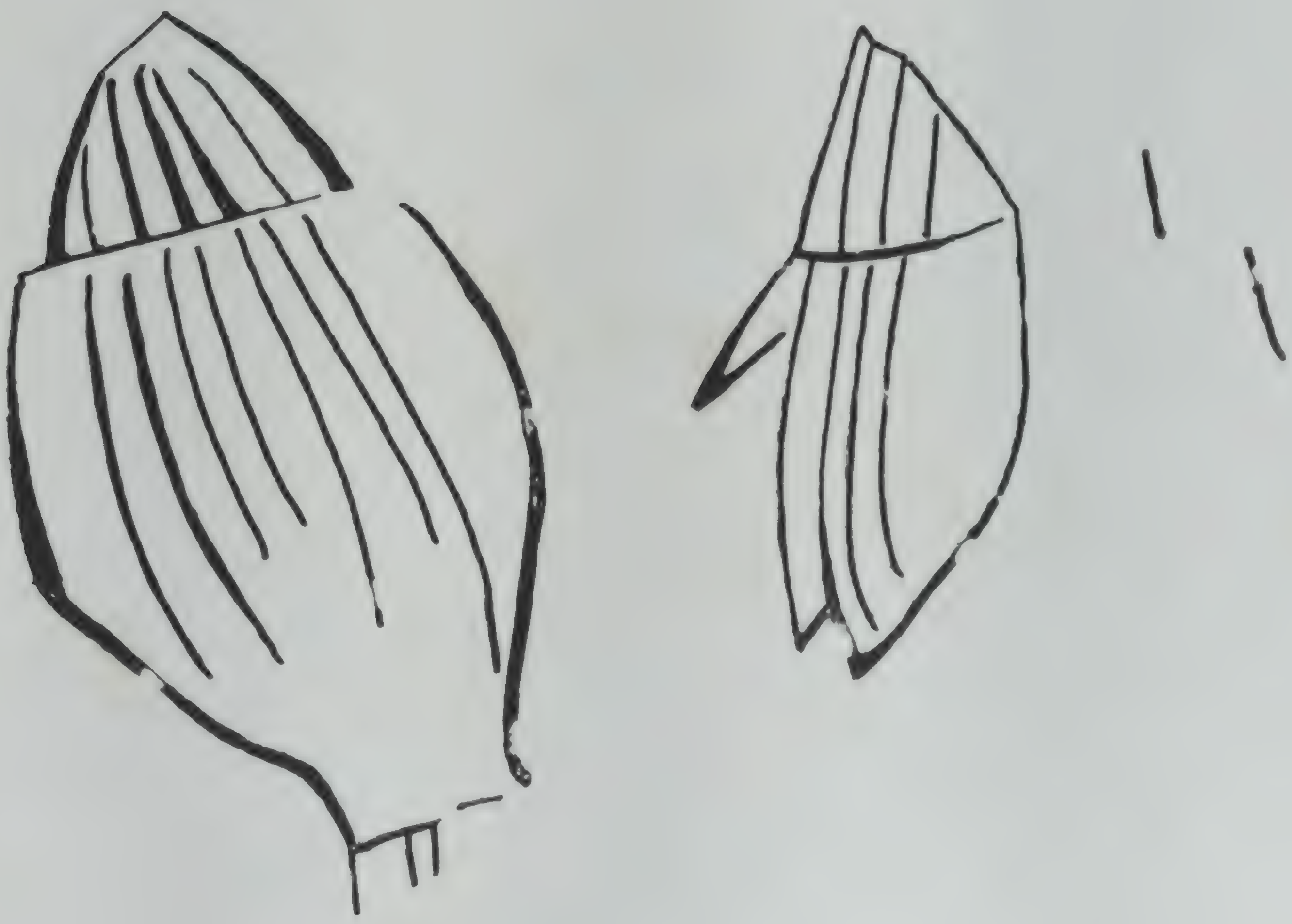

Fig. III. Paintings near Hemakuta temple group (Long fish, Short bulky fish)

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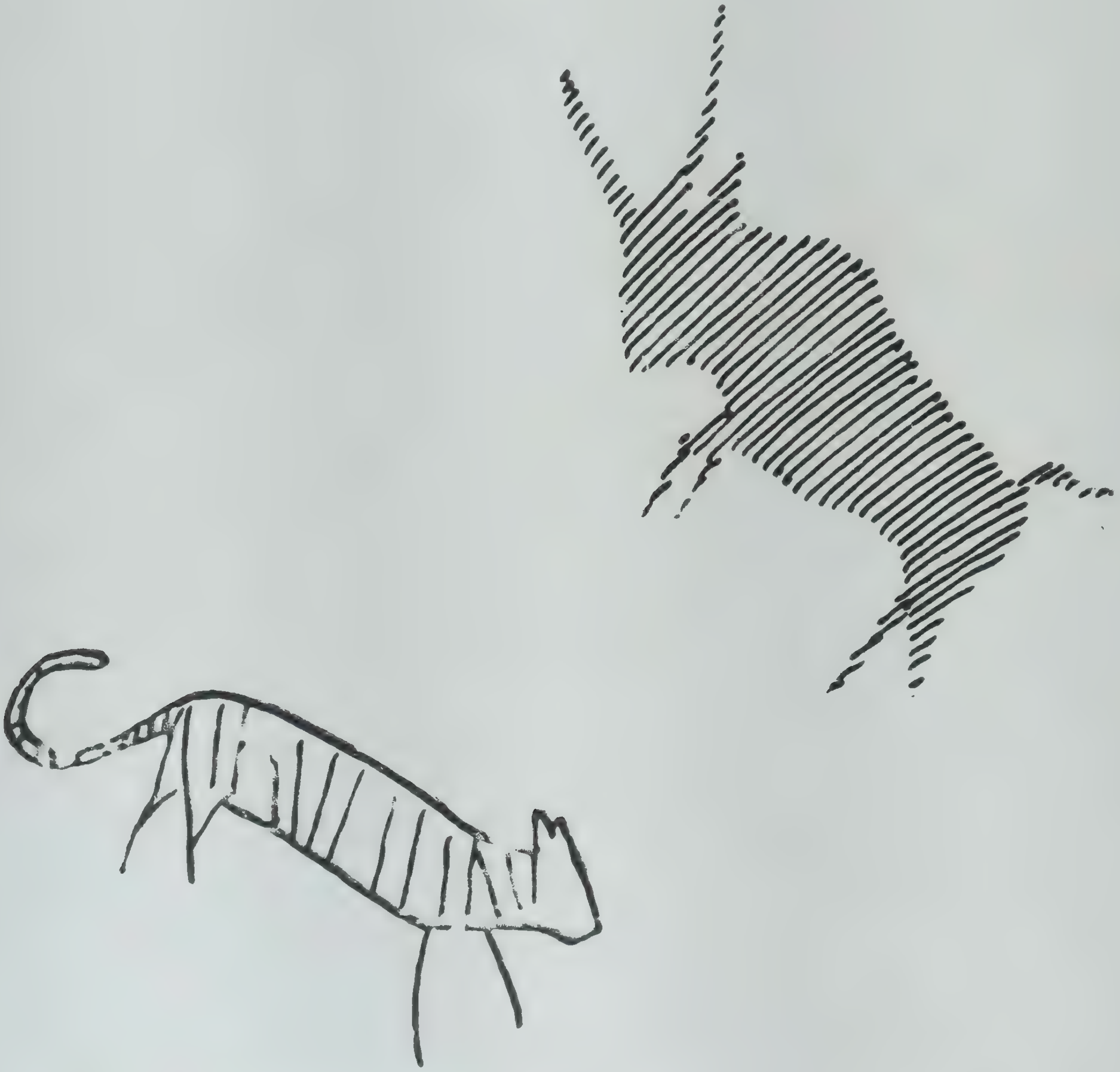

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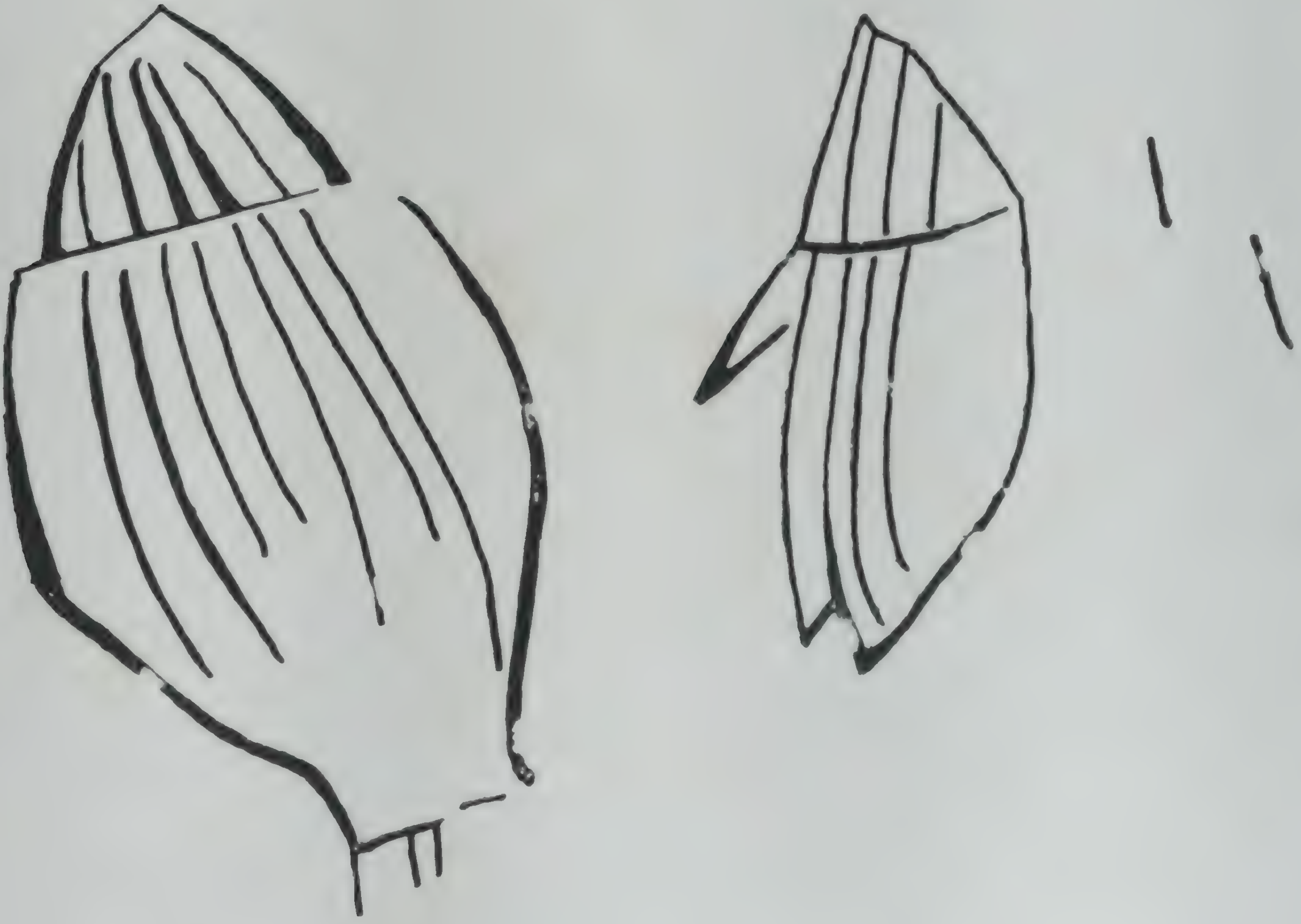


Fig. III. Paintings near Hemakuta temple group (Long fish, Short bulky fish)

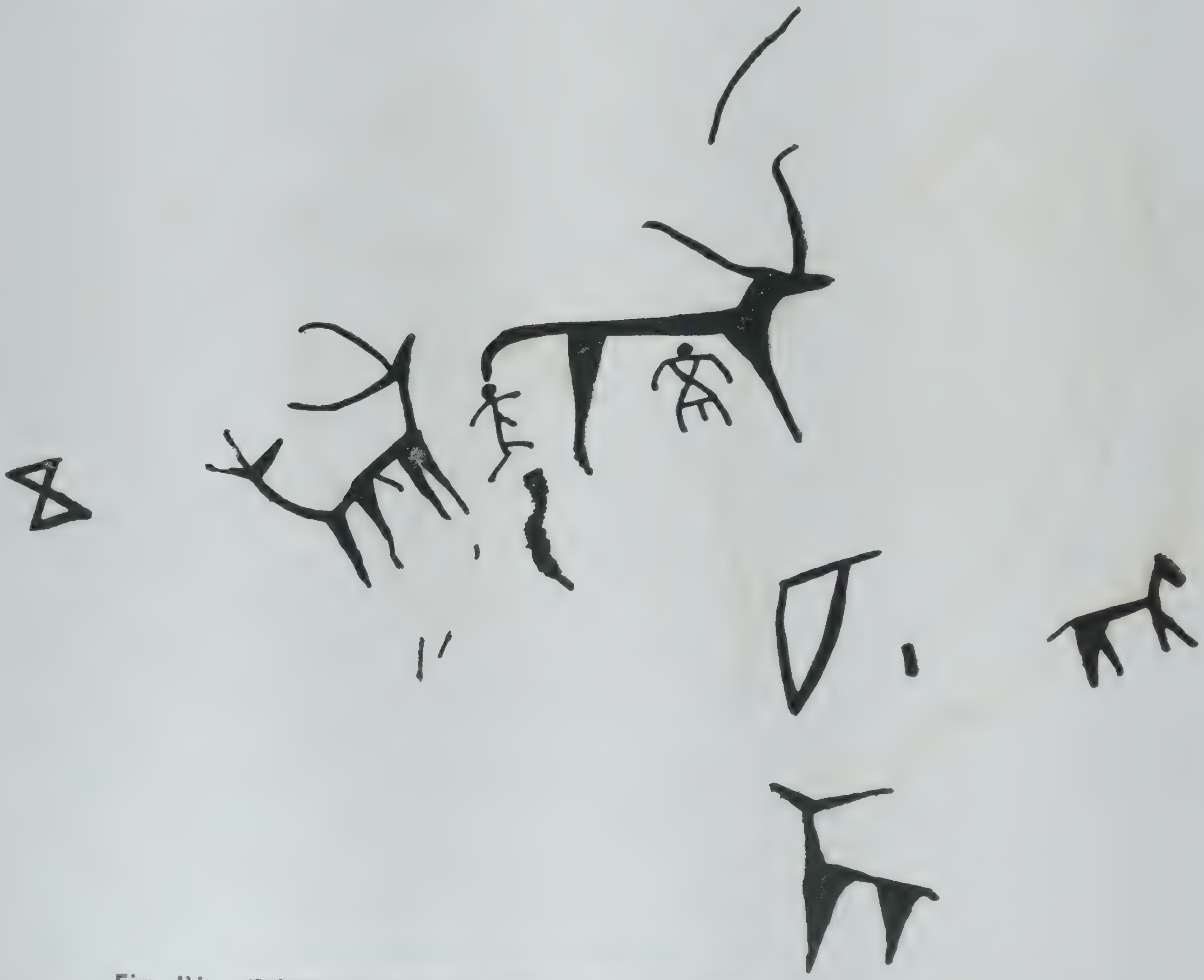
4. The Paintings near the junction of the roads

Here on the vertical surface of a boulder of a shelter are many figures of boat, animals and humans. The animals and humans are separately depicted in two groups.

The Animal Group

(Pl IV, Fig. IV)

In this group are three animals apparently cattle. Among them two are in silhouttee and one is in outline. One of them is the biggest ; the other two are more or less of equal size. These two are similar in style. The front and the rear parts including the legs are angular and pointed. The lower part of the trunk of the animal is strikingly attenuated. The horns of the one in silhouttee is almost U-shaped and the tail end, trifurcated indicative of its being hairy, is unusually raised up. The other animal similar in style but in outline appears to be incomplete. The biggest animal has a straight back. The limbs are plumpy. Unusually the horns are quite thick long V-shaped. Below the trunk is a small human figure in outline with hands held downwards and the legs bent at the knee are kept apart slightly. The trunk is delineated by intersecting lines in the form of Roman letter "X". The intersecting point indicates the attenuated waist a style noticed in many other paintings elsewhere : Venkatapura (near Vali Dibba), Hire-Benkal.



Fig, IV. Paintings near the junction of the roads, Animal group (cattles)

The smaller animal all comparble to those in Hire-Benkal rock painting No. 1 and No. 6 and Ramapura rock painting No. 2 which are within a reasonable distance from Hampi about 20 km. at the maximum as the crow flies.

The Human Group
(Pl. V, Fig. V)

In this group there are at least four humans that may be clearly identified in two rows : two in the upper and two in the lower. To the right of these two is each a painting not intelligible. The Humans in the upper, are in copulation closely similar to a human pair similarly engaged in the rock painting No. 10 at Hire-Benkal. The humans are indicated in outline the trunk being in X form similar to the other human figure below the animal in the animal group. To their right, there is an incomplete human figure in outline of similar style. Of the two in the lower group, the one to the left is similar to the figures above. The other one a little away is apparently incomplete.

Below the former is a fine specimen of an animal with U-shaped horns in silhouttee.

5. The Paintings near Baramadevargundu

This area is about 2½ km. from behind the "Virupaksha temple" and near the river bank. Here is an interesting group of paintings as if on a vast canvas; the flat vertical side of a boulder. All the figures one by the side of another are humans in dancing attitude. Four figures can clearly be identified. The first three from the left are drawn in side profile and the last is in front profile. The first two and probably the last are women. The remaining perhaps is a boy. All are strong and well-built. They stand with

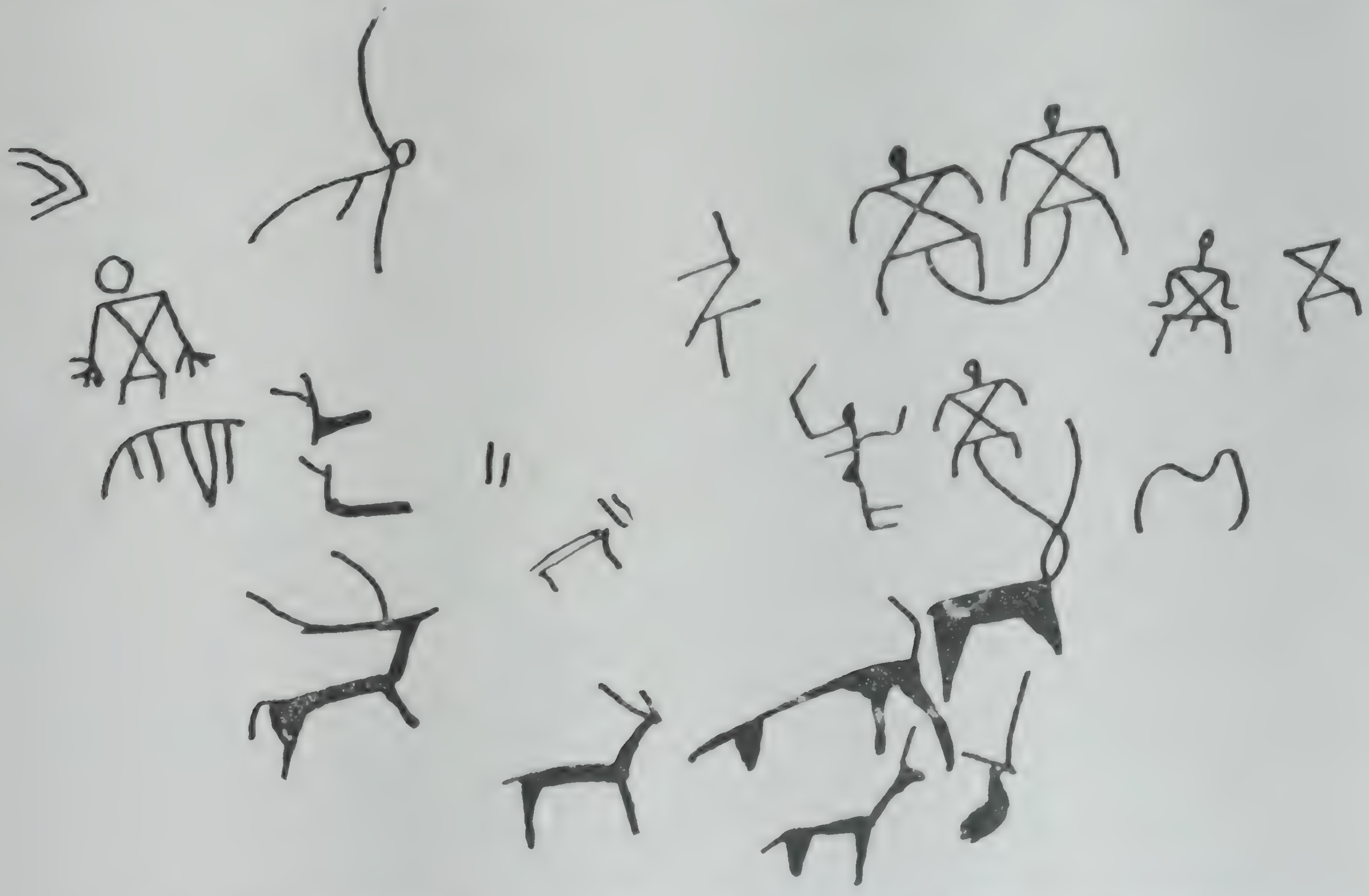


Fig. V. Paintings behind Virupaksha temple. Kadirampura Road (Human group)

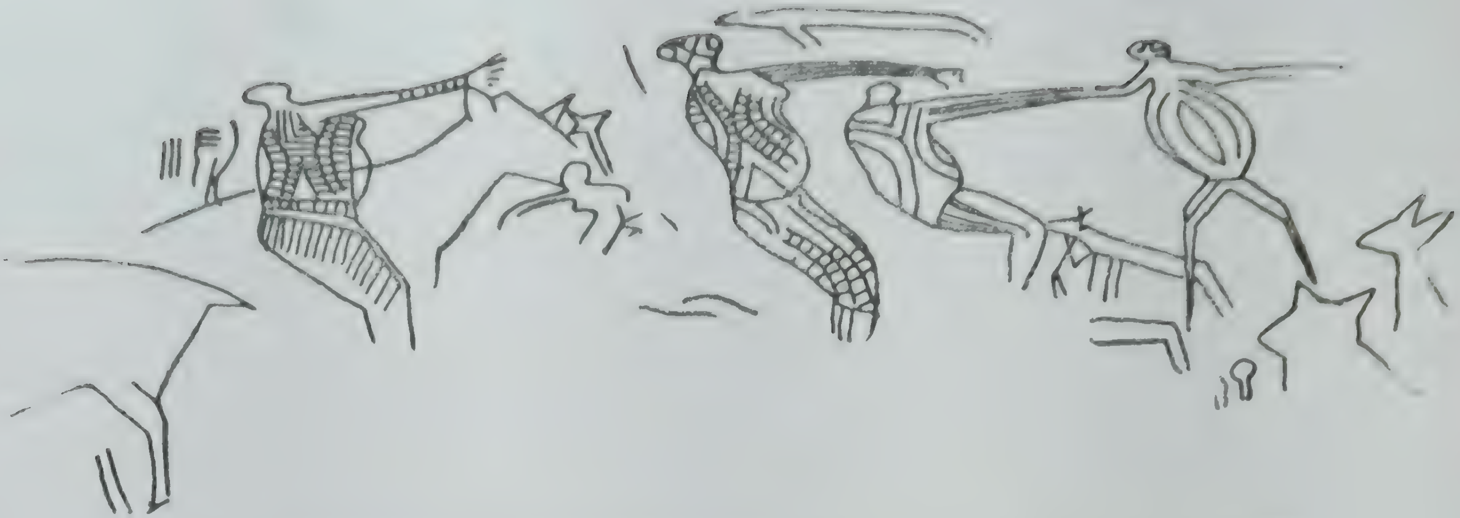


Fig. VI. Paintings near 'Baramadevara gundu' (A big panal having humans ; women-a boy (?) a women with painted body, etc.

the thighs obliquely bent and hands outstretched apparently in a particular posture of dancing. The last is with both the hands stretched apart in opposite directions. The body of all the figures is painted with geometrical designs. The design is dominantly like double lined X-type with parallel lines across within the double lines. The figure at the extreme right has vertical curved lines on the trunk. It appears the head is obviously deliberately not drawn, very unusual. The right hand seems to clasp the boy's hands on the right. The belly is strikingly bulgeous like a pot. The right leg is almost straight but in oblique position and the left leg, slightly bent. The painted design on the trunk is simple : parallel vertical lines curved nearer the sides following the bulgeous contour of the stomach, thus completely differing from that of the others. On the limbs lines are drawn along. The first two are clearly females as indicated by the pointed prominent breasts and rather prominent belly as if they are pregnant. The figure at the extreme left seems to have a tail in the upright position an out-fit fixed to the body probably while participating in a ritual dance. The head is as usual small painted with geometrical designs. The second figure from the extreme right i. e. perhaps a boy also does not seem to have the head depicted. It does not look as though this part is worn out with the passage of time. He appears half seated by bending the thighs almost horizontally. (Pl. VI, Fig. VI)

The whole composition was executed obviously more or less reasonably within a small period if not at one stretch. This is perhaps the rarest type of paintings almost exclusively of women engaged in ritual dance evidently connected with fertility cult.

Discussion

In relation to the paintings already known and studied certain features of and points relating to the paintings described above need to be discussed.

A. Regarding the triangular design in No. 1 it may be recalled here that iron arrow heads are found in the Iron Age Megalithic context at Maski,Hallur and in the recent excavations of the Megalithic Cairn circles in Komaranahalli near Harihara, Dist. Chitradurga (IAR, 1980-81; p. 29). In the last site it is noteworthy that some of the arrow heads from the burials have spike like pointed projections at the rear corner ends rather similar to the painted design.

B. It has been observed that wherever bulls of the kind and style depicted in No. 2, for instance, as also at other sites in

Anjanahalli near Anegundi, Piklihal, Belagullu (rock-bruising) etc., the persons at work were quite at home in bringing out majesty, robustness and strength of the species in excellence. In fact, this is the invariable feature of the figures in colour or in bruisings or terracottas as for instance, the specimens from Belagallu (Sundara; 1987) Chitradurga (Fig.No. 39) and Piklihal (Allchin, 1960) respectively. The tiger with stripes on the body in No 2 is not as clearly visible as the bull more symbolic in depiction not as commonly as the bull for the obvious reasons. The other scattered examples are Rock-painting No. 8 in Hirebenkal in the engravings at Billamarayana gudda and Chandravalli. The style of depiction of the figure in "Mosalaiahana gudda" i.e., No. 2 is nearer to that of Hirebenkal, and somewhat to that of Chandravalli.

C. In no 5 the purpose of abstracting the head in the female figure to the extreme right is probably to highlight the motherhood and fertility. Such an unusual type of depiction is not unknown in prehistoric art as e.g. the female figure with prominent breasts and protruding stomach, the face being completely concealed as if by the overgrowth of hairs, from Willendorf, Austria (Powell, 1966 ; pp. 14-22).

If the omission of the head in boy's figure is deliberate and if it is the indication of the closure of the eye sight while dancing with elderly women probably naked as part of ritual for successfully begetting (or delivering of) child, need to be examined by further studies and more discoveries. The headless woman with outstretched hands seems to be the forerunner of the concept of highly refined "Lajja Gauri" sculpture of the classical art of the early historical period (Sundara, 1980 ; pp. 367-369). The characteristic hatching of the double lined designs appears to be a distinctive feature of the art having religious significance. From the chalcolithic period onwards as very well known from the celebrated painting on a few potsherds and a jar of Daimabad fabric from Diamabad (Sali, 1986 p. 261 pl LXXIX, 7. pl. LXXX), the pattern of the design (without hatching) is intimately similar to the large sized human in No. 1 and the figure of No. 3 in Hire Benkal (Actually this painted rock-shelter is in the revenue limits of Mallapur and the paintings discussed by Shadaksharaiah elsewhere in this volume, are near to this shelter).

In Gangavati-Hospet region, large size female and nude male figures are comparatively in frequent, the latter being rather more in number. The male figures are both in outline and silhoutte found in Hire-Benkal (no. 3), Narayanapura (Sundara, 1980) Hampi and Chik-Rampura (No. 6), Mallapura respectively and the female in outline, in Mallapura and Hampi. A comparative study of these two classes seems to suggest a separate particular posture preferred in depiction of each class. The male is depicted nude standing with squat legs in front profile since in this posture the male organ could be prominently displayed as in No. 3 of Hire-Benkal and fore-hands raised skyward, and the female partially standing with the thighs bent obliquely and the hands stretched fully forward in side profile in which posture the feminine aspect could be distinctly displayed. In both the classes in outline, the body including the head is entirely painted with geometrical designs of obviously ritualistic significance. In Hampi, on the whole the entire group (including a boy ?) homogenously seems to represent a fertility ritual through dance by pregnant women.

D. There is definitely close similarity among the humans of the rock-painting No. 1 near "Sugriva Guha" and No. 5 "Baramadevara Gundu" in style and form including the designs on the body. Further, the designs on the fish of both the types near the "Hemakuta temple" group are intimately akin to those on the humans. All these paintings may therefore reasonably belong to one community.

E. The style of both human and animal paintings of No. 4 near the road-junction, is quite distinctive. The most characteristic feature of the style in the case of humans is the depiction of the trunk in X-form. Even the designs on the head and the trunk are essentially in X-pattern. And in the case of large humans the trunk is oval shaped sometimes slightly. Thus there are two distinct styles not to speak of the size: the X-and Oval style.

Similarly the cattle of No. 2 and those of No. 4 clearly differ from each other. The former is more natural in bends and curves and latter, angular especially the limbs together being zig-zag like the Roman letter "W". Thus there are two styles Natural and zig-zag.

F. The faunal representations(domesticated?) cattle, wild animal (tiger) and aquatic creature (fish and crocodile) in these paintings are in conformity with the natural ecology of the area with innumerable long hill ranges littered with trees and scrubs along the banks of the river Tungabhadra' being the natural homes of wild animals and aquatic creatures respectively.

G. The paintings therefore shed clear light not only on the art and rituals of, but also on the food and economy of the community who evidently practiced hunting and pastoralism.

Dating

Dating of rock-paintings in India is indeed a difficult problem.Circumstantial evidences, comparison with similar representations from the stratigraphic context that may be approximately dated; inherent cultural characteristics and stylistic features in space and time at present in India,present state of their preservation etc., are reported to for dating these works of art. Here also some of these are used as criteria for dating.

It may be noted here that any of the figures humans as well as animals are not comparable in style and form to those of the sculptural representations of paintings or of terracottas of the historical period. The latter are generally realistic. In all probability these paintings are not of the historical period and therefore pre-historic.

Secondly, the depictions are not realistic, but symbolically abstract a distinctive characteristic of the style of the proto-historic art of this region.

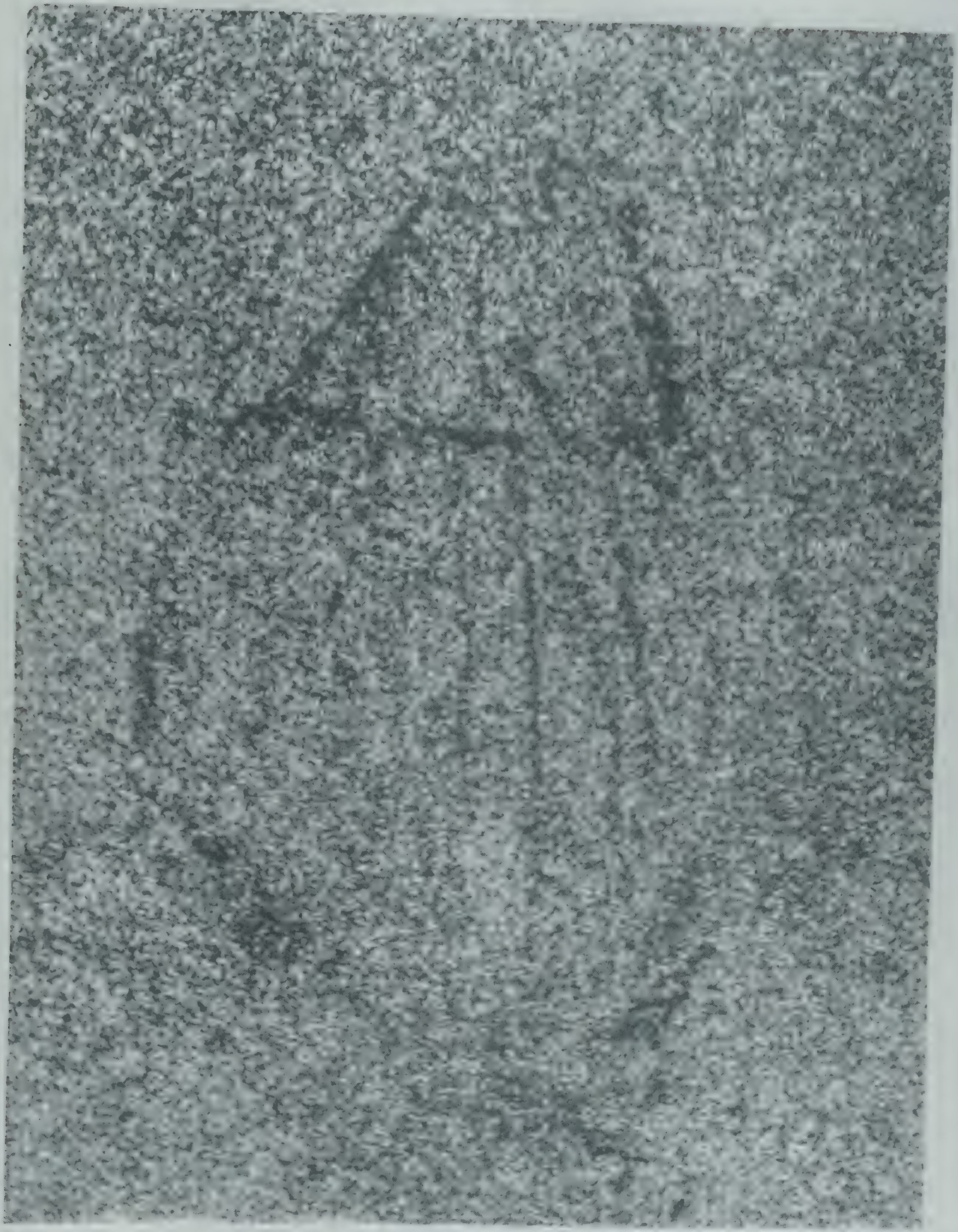
Thirdly, the characteristic hatching of the double lined designs appears to be a distinctive style of the art from the chalcolithic period onwards as very well known from the celebrated painting on the jar of the Daimabad fabric.

The type of the design looking like an arrow head of the painting No. 1 recalls the type of arrow rather functionally more effective from the excavated megaliths from Komaranahalli.Earlier in my discussion of the rock paintings in Hire Benkal the nude human of painting No. 3 there is assigned to the Iron Age megalithic period. Further depiction of the trunk of the human body by interesecting lines appears to be one of the styles frequently adopted probably by Megalith builders.

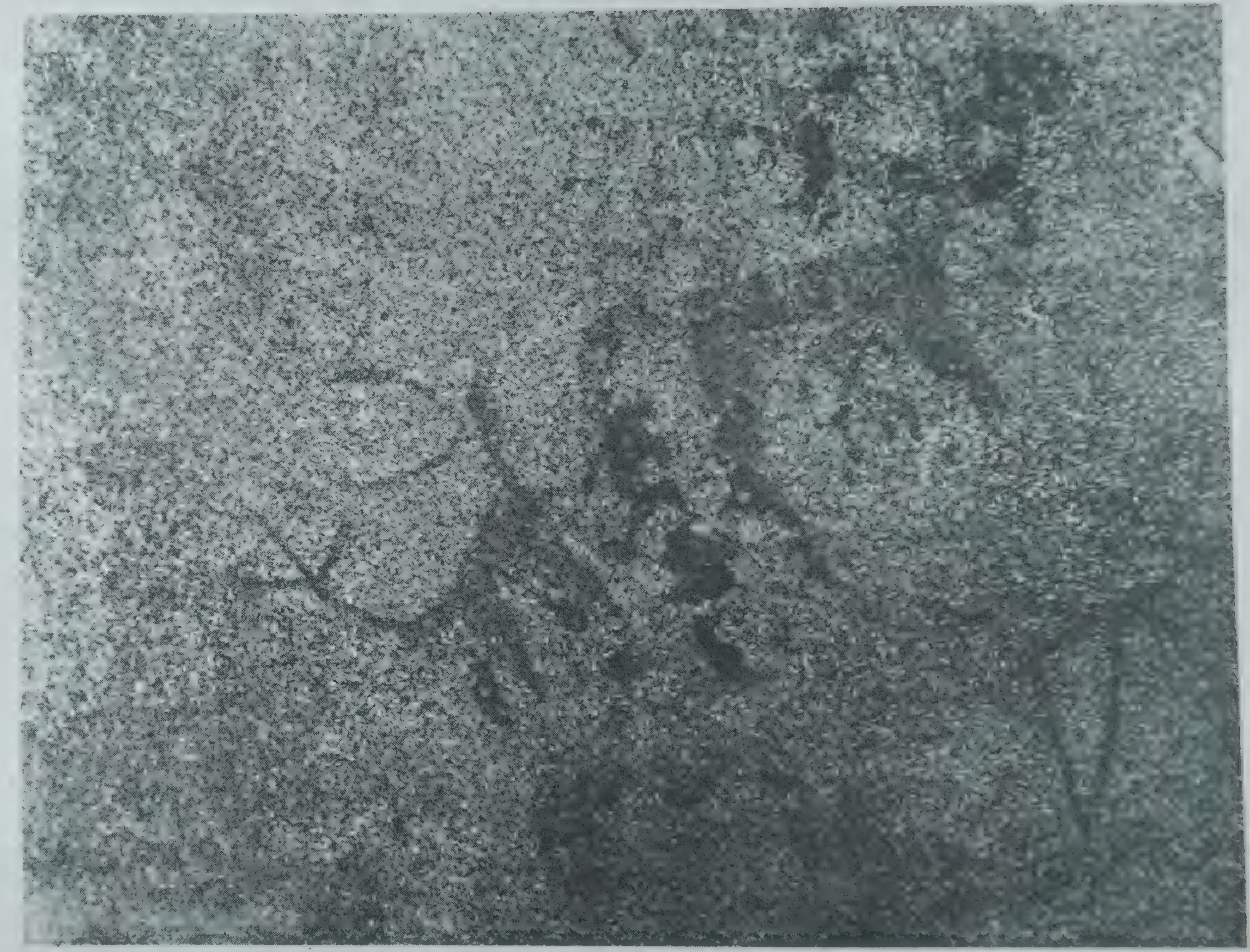
The cattle from Mosalaiahana gudda recalls the terracotta figurines from Sanganakallu (Ansari and Nagaraja Rao, 1965; p. 19) especially the style of the horns.Itis therefore probable that while the paintings of the Mosalaiahana gudda may belong to the neolithic culture in the chalcolithic stage most of the others may be ascribed to the Iron Age Megalithic Culture.

Pl. I Paintings in a cave near 'Sugriva Guha' human, crocodile, etc. close to the river Tungabhadra

Pl. II Painting on a boulder in Mosalaihana Gudda : bull, tiger, etc.

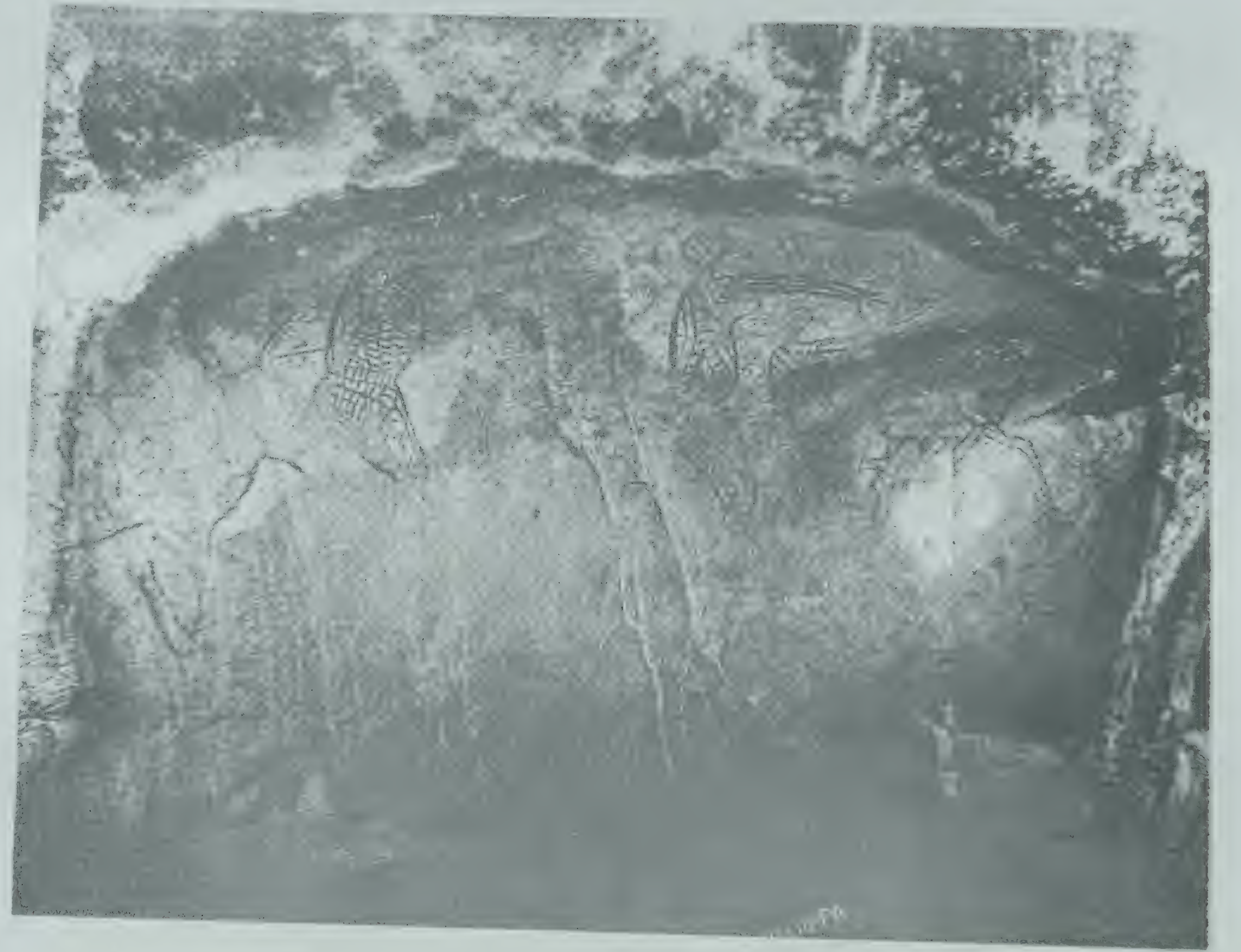


Pl. III Paintings near Hemakuta temple group–long fish, short bulky fish



Pl. IV Paintings near the junction roads: animal group – cattles

Pl. V Paintings behind Virupaksha temple, Kadiramapura road – human group



Pl. VI Paintings near 'Brahmadevaragundu' (A big panel having humans, Women, a boy (?), a woman with painted body)

31. ROCK PAINTINGS OF BHIMBETKA AND KARNATAKA : THEME, STYLE AND TECHNIQUE

Y. Mathpal

Bhimbetka is the name of a small hill in the western Vindhyas in Goharganj tasil of Raisen district of Madhya Pradesh. It is 600 m high from sea level and 100 m from the surrounding plains. The hill lies two km southwest of the small tribal village of Bhiyanpur. The Bombay–Delhi railway line and Bhopal-Itarasi highway pass close by the village. The village is situated 45 km southeast of Bhopal.

There is a series of massive rocks on the top of the hill, which, from a distance, gives an impression of a medieval fort. It is perhaps because of these rocks that local inhabitants called the hill as Bhimbetka–the sitting place of Bhima–one of the Pandava brothers of the Mahabharat epic who was celebrated for his enormous strength.

Although man has been living at Bhimbetka for last hundred thousand years, except for local population few people knew about it till 1973. And today "Bhimbetka" has become a synonym for "Indian rock painting". In the words of D. J. Mulvaney–the doyen of Australian prehistory". The Art of Bhimbetka now takes its place along with the prehistoric rock art of Western Europe, Southern Africa and Australia, as a major achievement of the art of prehistoric people" (Mulvaney, personal communication). Writing on Bhimbetka's contribution to prehistory (V. N. Misra, 1977; pp. 3–4) says, "Bhimbetka has given us for the first time in our country a continuous history of stone age man's cultures in undisturbed context. Equally important is Bhimbetka's contribution to our knowledge of prehistoric art. Here more than five hundred caves and rock shelters have thousands of paintings covering a period of nearly ten thousand years. These paintings tell us not only about the earliest artistic expression of man in our country but also help us in filling many gaps in our knowledge of prehistoric man's way of life. No other site in our country is so rich in prehistoric art as Bhimbetka. Indeed, with the discovery of this rich centre of prehistoric art India can take its place alongside France and spain which have so far been known for the richest centres of prehistoric art in the 'world". V. S. Wakankar (1975; pp. 7–29) who brought the site to light has named it as "The Prehistoric Paradise".

The area of Bhimbetka is 10 km east to west and two km north to south. There are seven hills in the entire region and over one thousand caves or rock shelters. Of these 642 bear paintings on their ceilings and walls. Thus we have no other site which can equal Bhimbetka in rock art. It is, therefore, likely that the Directorate of Archaeology and Museums of the Karnataka Government has offered an opportunity of a comparative study of the paintings of Karnataka and those of the Bhimbetka, during its Centenary Celebrations.

Karnataka's Contribution to Indian Rock Art

Although rock paintings in India are found from the Himalayas to the Nilgiris and from the Arawalis to the Kaimur ranges, their main concentrations, however, are confined to the sandstone regions of the Vindhya System. Nearly two third sites are situated in Central India in the forest-clad ranges of the Vindhyachal. Except a few sites at Atak, Gilgit, Kargil and Leh, the abraded drawings, on the other hand, are restricted to granite hills of peninsular India. But in Karnataka where there are sites like Maski which can boast for its several thousand petroglyphs of cattle, (pl. I) there are rich centres of pictographs too. Between the holy temple complexes of Pattadakal and Badami, there is a mini Bhimbetka at Aregudda in the heart of Katnataka. Because of their large number clear appearance and commanding location on the top of granite hills the engravings and bruisings have attracted scholars more. And it was thought that the entire South was void of painted drawings. The early explorers and excavators who were mainly interested in unearthening Neolithic settlements have missed painted drawings dimly visible on nearby boulders of the excavation sites.

There are 12 principal rock art regions with more than 30 important sites spread in Bellary, Bijapur, Gulbarga, Raichur and Shorapur districts of Karnataka. Of these 20 sites are situated in the Hire-Benakal area of the Raichur district. The earliest record of abraded drawings is that mentioned by Robert Bruce Foote (1916 : pp. 87-89). These bruisings were, infact, discovered by Hubert Knox in disirict Bellary in the eighties of the last century. Rock painting sites of the Benakal forest were first seen by Leonard Munn (1935 ; pp. 225-250). He recorded bruisings also at Kallur ane Togalgudda in the same area. F. R. Allchin explored several art sites at Koppal, Piklihal, Maski. Billarayan gudda and in the Benakal forest. A Sundara (1968 ; p. 67, 1974 ; pp. 21-32) has found 12 rock shelters in the hills of Hire-Benakal area. D. H. Gordon (1951 ; pp. 117-119) brought to light the incised drawings of Kupagallu hill near the Neolithic site of Sangankallu in Bellary district, K. Paddayya (1968 ; pp. 294-98) has recorded a few bruisings from Gulbarga district. The bruisings of Tekkalkota were first marked by M.S. Nagaraja Rao. Wakankar (1973 ; pp. 280-82) has recorded 29 painted shelters at Balcharar, Kishkindha, Tatkoti, Tekkalkota, Malgetti and Badami Jalashaya. In the year of 1980 the present writer noticed paintings of Mesolithic and later noticed dates in several dozen shelters at Aregudda, (Fig. I) Hiregudda and Badami (Mathpal, 1980 ; pp. 40-41, 1984 ; p. 23). Very recently, A. Sundara brought to light many more drawings from rock-shelters at Hampi in Hospet Taluka of District Bellary. These drawings illustrate pregnant women, dancers, soldiers, humped cattle, goats, fish and square-shaped symbols. Twenty five shelters with drawings of men and animals are noticed at Sugrivagudda-a place very close to Hampi. In the vicinity of Bellary, B. K. Gururaja Rao has recorded painted and bruised drawings of human and cattle at two places namely Belgal and Kurugodu. Similarly, R. M. Shadaksharaiah found very natural drawings of human and animals at Mallapur in Gangawati Taluka of Raichur District. The animal drawings include figures of buffalo, deer, stag, fish and snake. Thus Karnataka has a rich treasure of both the forms of rock art pictograph and petroglyph.

Theme : At Bhimbetka 29 animal species are recorded in the paintings of a single hill. Similarly, in the paintings of another hill 17 species are marked by me. These animals range from elephant and rhinoceros to rabbit and small creatures like scorpion and centipede. The deer out number all others. Wild buffaloes, gaurs, elephants and rhinoceros are painted as the most common game animals, although none of them exists in that area now. In the rock art of Karnataka there are 22 animal species painted and incised on rocks. These include elephant, buffalo, bull/cow, horse, donkey, dog, tiger, panther, boar. bear, sambar, swamp deer spotted deer, antelope/nilgai, goat, monkey rabbit, curious animal, peacock (pl. II) and otherbirds, snake and fish.

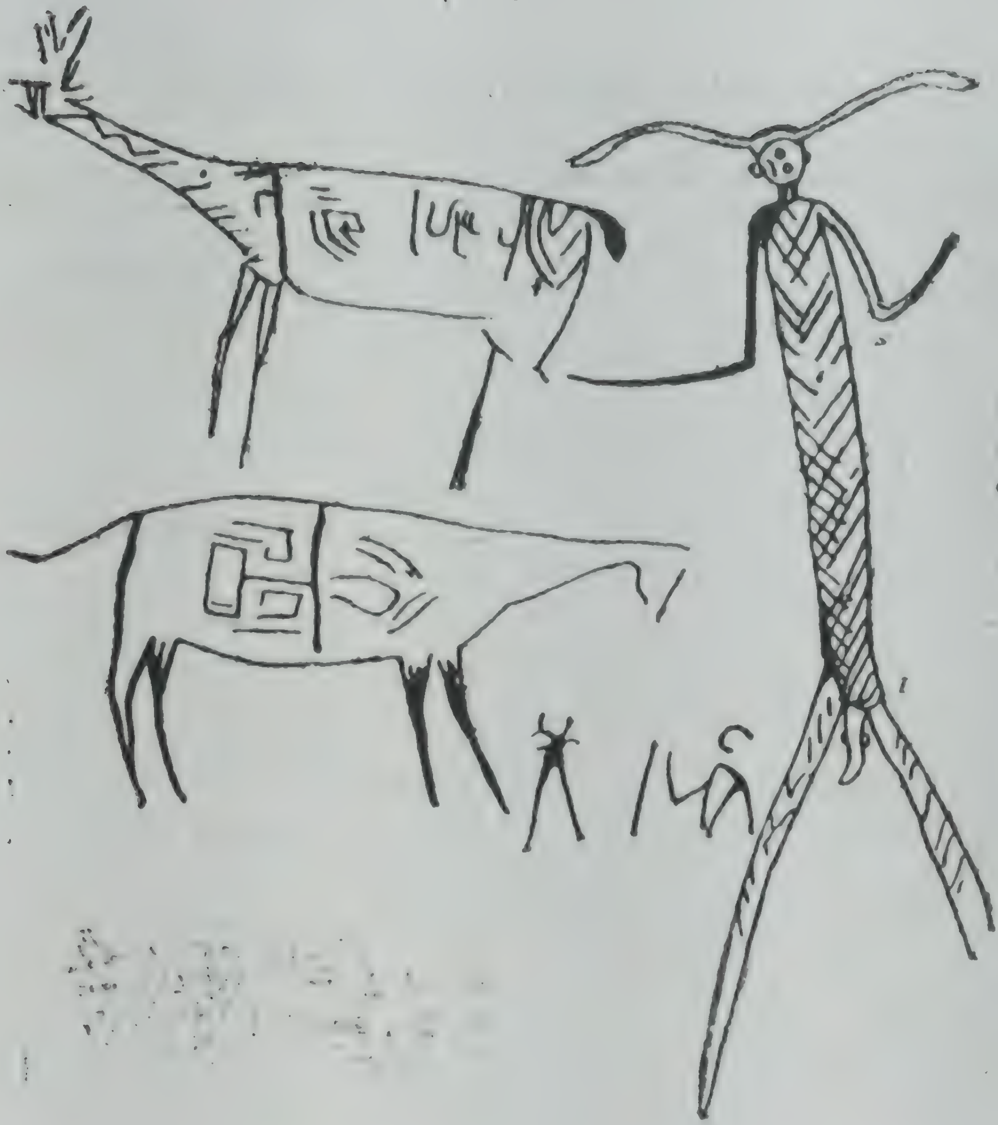


Fig. I. Painting of Human and Animal motifs, Aregudda.

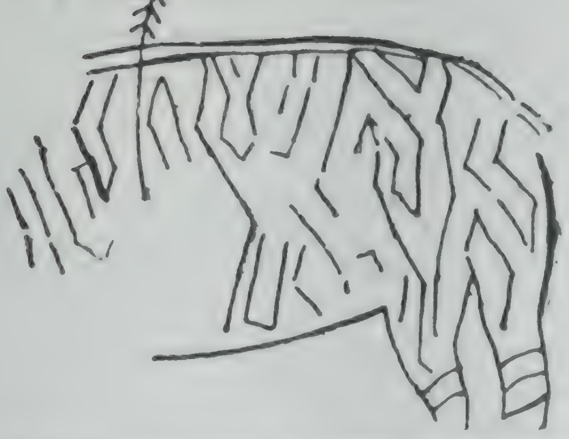


Fig. II. 'Animal with harpoon' one of the earliest painted motifs at Aregudda.

An areawise distribution of the animal species is given in the following table :-

S. No.	Animal species	Site
1.	Elephant	Benakal, Bellary, Billarayangudda, Malagetti, Maski.
2.	Buffalo	Aregudda, Mallapur, Tatkoti.
3.	Bull/cow/cattle	Aregudda, Belgal, Benakal, Hampi, Malgetti, Maski, Shidalphadi Tekkalkota, Piklihal.
4.	Horse	Benakal, Maski
5.	Donkey	Benakal, tatkoti
6.	Dog	Benakal
7.	Tiger	Benakal, Kupgal, Maski, Piklihal
8.	Panther	Benakal
9.	Boar	Badami, Mallapur
10.	Bear	Benakal, Tatkoti
11.	Sambar	Benakal, Kotekal
12.	Swamp deer	Kotekal, Mallapur
13.	Spotted deer	Aregudda
14.	Antelope	Benakal, Aregudda
15.	Goat	Hampi
16.	Monkey	Aregudda
17.	Rabbit	Aregudda
18.	Curious animal	Benakal
19.	Peacock	Maski, Benakal
20.	Other birds	Benakal
21.	Snake	Mallapur
22.	Fish	Hampi, Mallapur

Of all the animals cattle or humped oxen are most common species engraved on rocks. Very elegant drawings of oxen with large lyre-shaped horns and bulky humps are found at Piklihal, Maski, Billamrayangudda and Tekkalkota. At Kupgallu bulls with three horns and oxen raised on T-shaped stands are also found engraved. Drawings of long-horned cattle are very similar with the cattle drawings of phase VI (transitional period) of Bhimbetka. Large-sized images of wild buffaloes with heavy horns are found in the early phases at Bhimbetka. Torso portions of such animals are noticed decorated with labyrinthine and maze patterns. Fragmented images of animals with similar decorative designs are seen at Aregudda also (Fig. II). Drawings of boar and deer executed at Badami and Aregudda have a close similarity with the micrographic drawings of Bhimbetka. Not only the game animals but the hunters too are identical at both the areas of rock art. The stick-shaped hunters with masks and heavy head-dresses are found equipped with stone-tipped spears and bows and arrows at Bhimbetka as well as Karnataka. Group dancers and men and women engaged in sex-acts are also the common motifs painted at Bhimbetka, Benakal, Hampi, Kupagallu and Maski. Horseriders with metal weapons are found in historic phases at Bhimbetka, Maski and Benakal forest area.

A curious symbol which can be identified as a female genital is noticed by me at

Tekkalkota, Maski and Aregudda. Among the abraded drawings of Maski antenna-hilt swords are found several times with the images of peacocks (pl. II). Cattle drawn chariots or carts are seen at Maski and Aregudda. No such sex symbols, independant images of swords and chariots are noticed in any painting at Bhimbetka.

In the close vicinity of the famous Chalukyan temples at Badami, there are several shelters with old rock paintings. While most of the paintings are executed with red ochre there is a well preserved painting in dark black colour. The painting marked on the vertical face of a pink sandstone rock has some outstanding features not found elsewhere. There are 14 men and four animals all executed in different poses and styles. The two main figures of a man and woman are shown prominently in the middle of the picture. They are wearing masks and their bodies are decorated from heads to feet. The male figure measuring some 150 cm has long head hair and beard. The woman has a decorated waist covering. These two figures as well as other figures of human and animals have clearly depicted eyes- a rare features of rock art not found at Bhimbetka or any other site (pl. III).

Style : In my study of Bhimbetka paintings, I have grouped all the 6214 figures into three broad categories on the fundamental idea of three approaches-representational or natural approach, geometric approach and abstract (Schematic, simplified or conventional) approach. Figures of each category are further divided into four subgroups on the basis of extent of colour filling. As a result of this study it was found that at Bhimbetka 34.03% figures are natural, 38.49% abstract and 25.07% geometric. Abstract figures are common in Phases IV and VI whareas most natural figures are confined to Phases II and III. The trend towards geometric approach was found in the paintings of Phase V. Similarly, in Karnataka's rock art, painted images of earlier phases at Aregudda, Badami, Benakal and Tekkalkota are more natural than abraded drawings of cattle at Maski and elsewhere those are certainly, of the Neolithic period. As a general rule, images drawn with pigment are more natural than the figures incised on boulders. It is perhaps because of the fact that painting on rock is more easy than abrading them on a coarse surface. Most of the petroglyphs are stylised and simplified images and are close identical with the terracotta bulls of Chalcolithic Kayatha where main emphasis was given on horns and hump of the animal.

In painted figures sometimes inner organs of animals are shown in X-ray style. Where the organs are not shown the space of torso is filled with geometric designs. This treatment of space filling is very common in rock paintings. At Badami, Aregudda and Hiregudda internal organs of animals are shown in geometric patterns sometimes with a series of parallel zig-zag lines or check patterns.

Technique : Paintings at Bhimbetka and elsewhere are always executed on a bare rock surface and without any preparation of background. Except for a painting at Sanchi no where background colour has been applied before drawing figures. Although as many as 21 colours have been noticed in the rock art of Bhimbetka except for a few drawings all the images are monochrome. Animal figures are all in profile and human figures mostly in front or back poses. Figures are either shadowgraphs or line drawings. Colour is used as transparent liquid, opaque dry crayon or spray paint. In the earlier phases it is the transparent colour technique which dominates. The opaque colour paintings are mostly found in historic phases.

Crayon or dry colour technique is limited to a few figures and the stencil technique is used only for negative hand prints. More than half figures (53.41%) are found executed with the transparent colours. In the old paintings at Aregudda and Badami the transparent technique has been applied by the rock painters. The petroglyphs at Maski Piklihal, Tekkalkota and Sangankallu are drawn either by incising outlines of figures or by pecking the surface of the granite and thus changing its colour. Granite rock has a rough surface and particles of rock give a tint colour after being hammered or bruised with a hard object. All the engravings and bruisings belonging to Neolithic and later periods have been drawn with these two techniques only. No such abraded drawings are found at Bhimbetka.

The study of Indian rock art is still in its infancy. It is a matter of great sorrow that despite the facts that the eariest prehistoric paintings were discovered in India and from their first discovery they were rightly dated to the Stone Age, no systematic efforts have so far been made to study Indian rock art. It is an open fact that wherever there are caves/rock shelters, water and food resources man had been living in that area. The sandstone which easily forms shelters also presents a natural canvas for painting. It is hoped that future exploration work in the sandstona regions will certainly bring to light many more rock painting centres in Karnataka and the map of peninsular India will be dotted with rich rock art sites.

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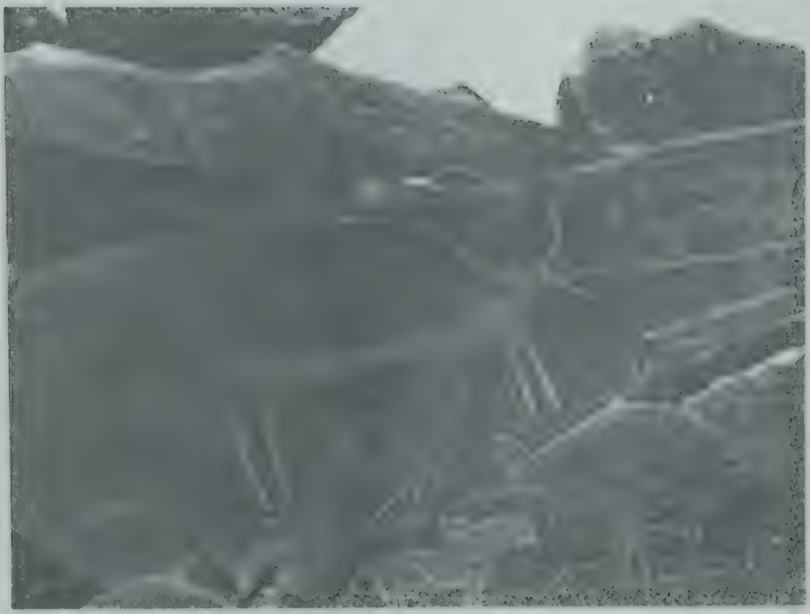
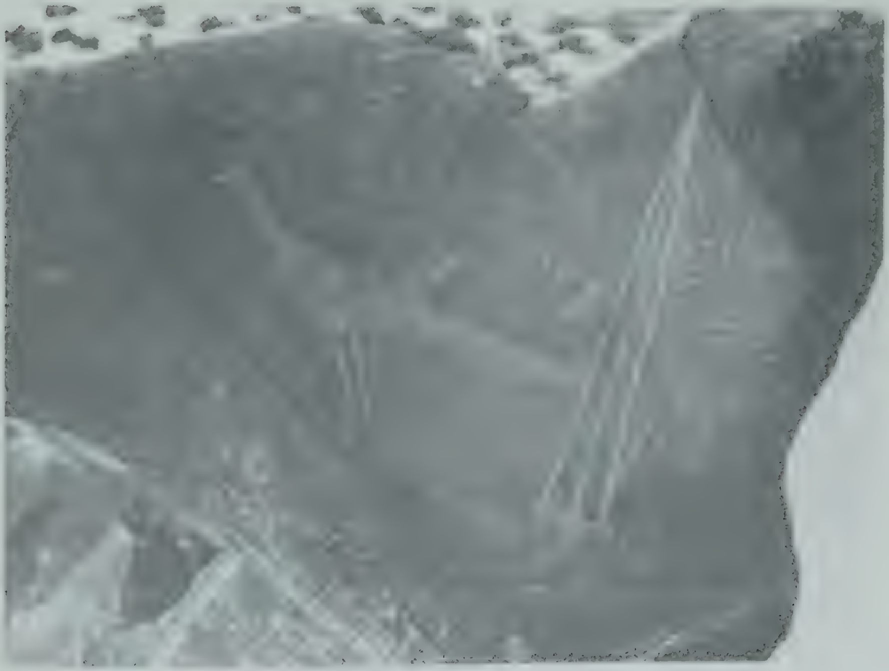
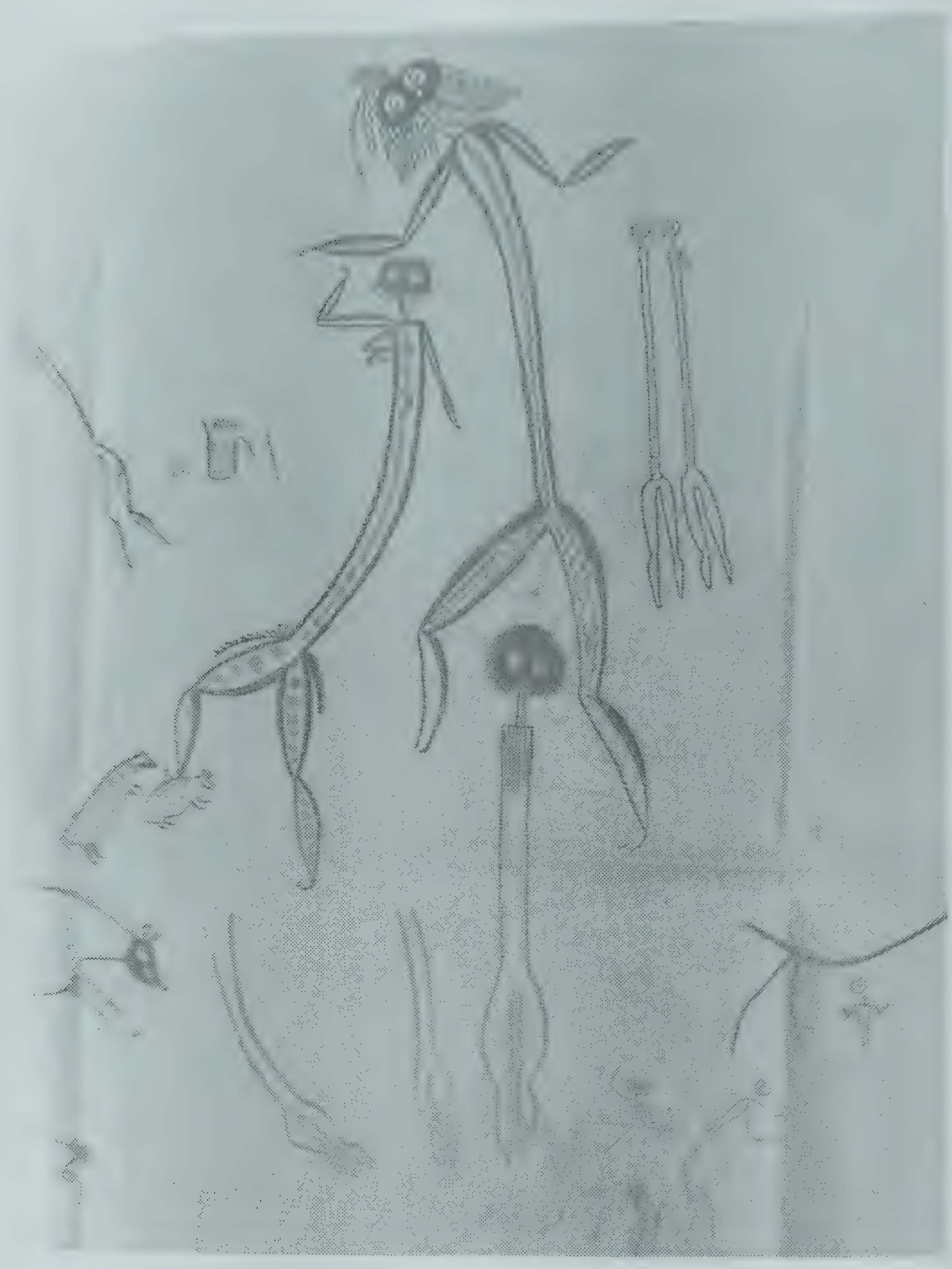


Pl. I 'Oxen on rocks' - Petroglyphs at Maski



Pl. II 'Peacock with antennae hilt sword' - A petroglyph from Maski



Pl. III 'Marked human figures and animals' – A painting from Badami

32. THE SALIENT FEATURES OF SATAVAHANA MATERIAL CULTURE IN ANDHRA AND KARNATAKA REGIONS

V. V. Krishna Sastry

Culturally Andhra Pradesh followed the same pattern as Karnataka from the beginnings of the history of the mankind. My purpose here is to draw parallels wherever it is possible between the early historical material culture of Karnataka with that of Andhra Pradesh. It is really heartening to know that so far 350 early historical sites have been discovered in Karnataka. Same pattern is noticed in Andhra Pradesh. A large number of sites belonging to the early historical period are noticed in the districts of Nizamabad, Karimnagar, Warangal and Khammam of Andhra Pradesh. I cannot vouchsafe that there were no early historical sites in other districts. They were there, but the recent spread of irrigation and spurt of vandalism caused immense damage to most of the sites. Many houses in some modern villages have been built with the brick of the Satavahanas collected from the neighbouring ancient mounds. Kapparaopet in Karimnagar district consisting of more than 300 houses were entirely built of Satavahana brick ransacked from the Kotilingala habitation site. Similar is the case at Dhulikatta, Chandavaram etc.

The State of Andhra Pradesh claims a distinct pride in possessing and excavating a large number of Satavahana sites. As already stated the districts of Nizamabad, Karimnagar, Warangal, Mahboobnagar of the Telangana region are studded with a large number of Satavahana sites; both village settlements and urban centres. Recent excavations conducted at a number of places yielded a rich crop of Satavahana structural remains and antiquities like beads, iron implements, pottery, coins etc. which give us a closer insight into the material culture of the period. I shall mainly focus upon the results of excavations conducted by the State Department of Archaeology at Peddabankur, Dhulikatta, Kotilingala all in Karimnagar district; Kondapur in Medak district.

Settlement Pattern

Let us first discuss about the settlement pattern of the above sites and also some other minor sites. The Satavahana sites in the above districts were found in almost every alternate village, as to lead us to surmise firstly that the political nucleus of the whole or a part must have been situated in this region. Secondly, the population during the rule of Satavahanas must have multiplied manifold. The region became economically prosperous due to development in the fields of agriculture, industrial technology, internal and foreign trade. As most of the sites are found in black soil areas, the main occupation of the people was agriculture. This was also supported by a large number of iron objects like sickles, plough shares, hoes etc., discovered in excavations. Many habitation sites arose along the rivers and rivulets. Kotilingala is situated at the confluence of the rivers Peddavagu and Godavari; Peddabankur and Dhulikatta on the bank of rivulet Hussainivagui. Kondapur on the bank of a major rivulet which is a tributary of Manjira river. Even Sannati in Karnataka rose on the bank of the river Bhima. An examination of the distributional pattern of the above sites indicates that the people had a predilection for proximity to perennial water source. However, a large number of brick wells of the Satavahana period exposed at Peddabankur, Dhulikatta and Kotilingala would suggest that when the rivers have dried up in summer, the wells have supplemented their water needs (Krishna Sastry, 1983; pp. 124-125).

Architecture : Military

The ruins of the early historical towns are divisible mainly into two categories. The fortified and unfortified. The towns and villages which are politically and commercially important were protected around with mud ramparts and moats outside. The towns like Kotilingala and Dhulikatta were mainly inhabited by traders, kings, chieftains or noblemen. The villages were inhabited by the agricultural folk along with artisans like potters, carpenters, blacksmiths etc. The villages do not have any protective ramparts around. The material used for raising ramparts was always mud, dug out from outside the settlement on all sides. The trenches thus excavated served as moats so that the earth thus obtained was utilised for raising the mud embankment (*pamsu prakara*) or for making bricks. Initially the moat was planned as it was necessary to raise the rampart and also to connect the moat to a perennial water source, so as to ensure water supply throughout the year. According to Kautilya, the height of brick wall including the mud rampart should be 36 feet from the ground level and battlements were built over the mud wall. There might have been a road or pathway at the top of the parapet running all along to enable the armed guards move about.

The present height of the mud rampart at Kotilingala (Ramachandramurthy & Krishna-Raju, 1982-83) is 6 gm. from the surrounding plains. It was enclosed by the river Godavari on the north and by a rivulet on the east. The situation of Kotilingala is almost similar to Sannati in Karnataka which stands at the confluence of the river Bhima and another rivulet. The main gate of the Kotilingala fort is noticed towards south connecting the highway. No rampart bund is noticed along the Godavari river bank but there might have been a brick wall all along. Similar is the case with Sannatj.

Dhulikatta : The Satavahana mound at Dhulikatta ,to an extent of 18 hectres of land, is encircled by a mud embankment, which must have served as a rampart. Four gateways were traced at the four cardinal points. Excavations at the southern gateway brought out the plan of the guard rooms with provision of a gatehouse. The guard rooms appear like two rectangular halls facing each other separated by an intervening passage of 4.40 metres wide. Excavations revealed that the gateway was built after the embankment was laid. Flooring inside the guard rooms was paved with brick. The intervening passage between the guard rooms was paved with rubble and strengthened with morrum and silt. The passage is squeezed in the middle for provision of casemates or ambush niches provided into the body of the wall (Krishna Sastry, 1983; pp. 132- 133).

Peddabankur : The settlement at Peddabankur was a village site with no mud embankment around. However, three huge brick structures, two of them with similar dimensions measuring 30.80 x 30.80 metres, and a third one measuring 16.80 x 15.80 metres were exposed. These enclosure walls were probably '*prakaras*' provided with a single gateway either in the north-east corner or north-west. These were evidently inhabited by the wealthy individual families. The prakara walls are 2 metres broad. It is not possible to surmise as to their original heights. These prakaras contained houses, wells, cisterns etc., inside. It is also possible that some of them might have served as market yards due to the provision of broad gateways intended to allow vehicular traffic inside.

It is also likely that wealthy people preferred to have enclosures around their houses. A brick well noticed by the side of the northern wall of the first enclosure, another well near the western wall and a third well quite adjacent to the southern wall might support the above view. In the second enclosure there are no wells but it was there on the outside at the north-east corner. The water used from this well was lead out to a soak pit lined with terracotta rings. (Krishna Sastry, 1983; p. 134).

The plans of the civilian houses are elliptical or rectangular. A number of houses, elliptical in plan, are found at Peddabankur. Houses with elliptical or oval plan were in vogue from the Mauryan period if not earlier. An oval structure belonging to the earliest phase found at Peddabankur measured 10.35 metres at the longer axis and 7.65 metres at the middle. The thickness of the the rubble wall is 40 cm. A 1.15 metres wide entrance is noticed in the middle fo the southern wall. In the centre of the structure, four circular rubble platforms which must have served as a basement or platform are found. Four more circular basements were noticed at the western end inside the structure.

Another elliptical structure which is found inside the third brick enclosure belongs to the late phase and measured 11.60 x 5 35 metres with a 35 cm. broad foundation wall and a 2 metres wide entrance. A few brickbats noticed over the oval rubble foundation might indicate that the superstructure was raised with bricks and the roof covered with thatch. It might have had a wagon shaped roof as commonly noticed in the Buddhist sculptures at Amaravati.

The earthen embankment at Kotilingala presently exists to a height of 8 to 9 metres from the surrounding ground level. The length of the southern mud fortification wall is 1054 metres in the east-west direction and 333 metres wide in the north-south direction. The river side of the habitation does not have an embankment but there are remnants of disconnected brick walls. Adjacent to the southern rampart, outside, a massive brick wall was exposed to a length of 19 metres (60 feet) with 11 courses of brick existing now. At the south-east corner of the fort, a bastion or a watch tower which is rectangular in plan came to view. It has 7 courses of brick and measured 11.35 metres long and 7 metres wide with a forward projection towards south. The bastion is probably the first of its kind to be exposed in the Satavahana forts of Andhra. The excavation at Satanikota in Kurnool district conducted by the Archaeological Survey of India also revealed a massive fortification wall and a moat outside. There is an elaborate gateway. The material used for building the rampart at Satanikota was the locally available Cuddapah slab of irregular dimensions and mud mortar. The wall rises to 13 courses of stone with a brick facing in 5 courses. Interestingly, a moat was noticed outside rhe rampart quarried into the natural bed tock as can be seen by the extensive chisel marks. The gateway complex is an outstanding architectural part of the fort. The entrance was provided with a flight of five steps each having a width of 3 metres (10 ft), flanked by a balustrade of baked brick and stone. Here, there are evidences for the use of a draw bridge in the form of 3 pairs of sockets for inserting heavy wooden posts. Massive buttress or rivetment walls are also encountered, running at the foot of the earthern rampart at Satanikota as at Kotilingala (Ramachandramurthy & Krishna Raju 1982-83).

The most potent factor giving rise to development of towns in ancient Inida was the presence of water in abundance. All the important towns and villages rose either on the banks of rivers or rivulets. Besides, the settlements were self-sufficient in water with provision of man made reservoirs. The three main varieties of water reservoirs as mentioned in Aparajita Puruchva a very late work, are *Vapi, Kupa* and *Tataka*. Ten varieties of Kupas or wells are mentioned according to their dimensions. Panini also recorded that villages depended on wells for supply of water. These wells were attached with *nipanas* or water troughs for provision of drinking water to the cattle.

During Satavahana period, besides the use of rivers, we notice a large number of wells constructed either of brick or terracotta rings. Even in the case of settlements found near the rivers, construction of wells was commonly practiced. At Peddabankur we have exposed as many as 22 wells. Of these, there is only a single well lined with terracotta rings encased with a brick platform around. One well is exactly square in plan and the remaining 20 are round and constructed with wedge shaped brick the antiquity of which may be traced from the Harappan period. Interestingly, some semicircular flat based hog backed bricks, with a height of about 30 cms., were fixed over the top courses of some of the wells at the place wherefrom water was drawn. The hog-backed coping brick would allow water to slip inside or outside the well while drawing and the steened brick of the well would not be damaged. During dry periods some of the wells also dried up and they were used as refuse pits for throwing garbage like broken pottery, animal bones, ash, cinder, iron slags, corrugated tiles, terracotta beads, and many times broken pots used for drawing water. Sometimes, covered drains of brick were constructed to lead out the used water at Pedd bankur and Dhulikatta. The floor of the drain was also paved with bricks and side vents were provided at regular intervals to the drain for leading out excess water into the earth for avoiding bottle-necks. The total length of the Peddabankur drain is 11.15 metres.

One brick well exposed outside the second enclosure at Peddabankur had a soak pit lined with terracotta rings as an adjunct to let out the used water. It appears that water was lifted from the wells with earthen ware or iron pots with the help of windlasses or pullies. Some sockets for carrying the vertical poles of the wind-lasses are noticed.

Brick cisterns or troughs invariably formed the essential feature of civic life. At Peddabankur there are many brick cisterns with floors rammed with morrum and then with brick. The above said hog-backed or coping brick was fixed over the walls of the cisterns. The shape of the utilitarian hog backed coping brick in the domestic architecture was adopted as an ornamental stone coping over the Buddhist railings.

Religious architecture

None of the Satavahana sites excavated in Andhra Pradesh gave us evidences of Brahmanical temples (Krishna Sastry, 1983. p. 143). A single brick cell at Peddabankur measuring about 5.30 x 4.90 metres, which is almost square in plan was surmised to be the ruins of a Brahmanical temple. However, there is no clue as to the diety to which it was dedicated. Chases or sockets cut into the body of the walls inside suggest that the roof was supported by wooden poles.

Buddhist : While excavating the early historical site at Peddabankur, Dhulikatta or Kotilingala (Ramachandramurthy and Krishna Raju, 1982 83) we did not get any clue as to the religious proclivities of the people, not withstanding the occurrence of terracotta figurines of Mother Goddess, Yaksha and animal. The discovery of a Buddhist stupa at a distance of 1 km. exactly north of the Dhulikatta mud fortification and a large number of inscribed wedge shaped stone slabs of stupa at Kotilingala lead us to surmise that the Buddhist religion was more organised, institutionalised or patronised than the Brahmanical.

The stupa at Dhulikatta consisted of a brick drum (*garbha*), to a height of 2 metres raised over a single layer of rubble basement. The dome (*anda*) rises to a height of 5 metres over the *garbha* and crowned by a *Harmika* which is a simple square brick structure. The *yashti* and *chatra* were dismembered. However, fragments of a lime stone *chatra* were found scattered in the vicinity of the stupa. For getting a hemispherical shape, the dome or *anda* was raised with alternating courses of brick and morrum.

The stupa was embellished with 47 carved *Ayaka* slabs which are mostly intact. One of the slabs contained Naga Muchilinda canopying the feet of the Buddha. At the top frame of the Naga figure there is a Brahmi inscription reading as "Gahapatino Pathalasa Matuya Samayadanam". Another Naga slab was inscribed as "Pitha Nandi Puthasa duhuthooya Sayonija danam". On the north-west of the stupa a series of monastic cells which measure 3. 30 to 3. 50 metres were exposed. The brick walls of the monastery consisted of two alignments of single brick courses, laid separately with an intervening gap of 42 cms. This gap was filled in with a tight pack of waste brick bats and morrum, a device adopted firstly to restrict usage of brick, secondly to have a massive wall to be covered with a heavy roof. We find this device adopted in almost all the massive medieval temples where the inner and outer layers were constructed of stone and the middle gap filled up with earth or rubble (Krishna Sastry, 1983; pp-144-145).

Food habits

The economic life of the people during the Satavahana period was a combination of agriculture, animal husbandry and hunting. Most of the towns and villages grew in the middle of arable plains of black soil. The towns were inhabited by the kings or the feudal lords or the people who were engaged in commercial activity while the villages were peopled by agriculturists, artisans etc. The occurrence of a large number of iron sickles, plough shares or hoes supported prevalence of a well-established agricultural system. Palaeo-botanical study of the plant remains recovered from the early historical levels at Veerapuram (Sastry, T.V.G; 1981) in Kurnool district reveal the cultivation of rice (*Oryza sativo linn*), pulses like blackgram (*Phaseolus Mongolinn* common), pea (*pisumar vinse linn*) and Hyacinbean (*Dolichos Lablab linn*).

The existence of a number of mullers mealing stones, pounders, saddle querns and pestles suggests the cultivation of dry crops like jowar and ragi. Thomas, who studied the faunal remains from Veerapuram identified them as those of cattle, buffalo, sheep, goat, ass, gour, cheetal, chinkara, hare, fowl and aquatic species like turtle, crabs, mollusc and fish. Similar species are also reported from Yeleswaram (Alur, 1972) and Peddabankur. Thus it appears that both wild and domestic animals served a part of their food needs besides the above cereals.

Peddabankur excavation yielded a terracotta seal with an inscription around the perimeter in Brahmi characters reading as "Vijayapura hara kasa rathasa"(KrishnaSastri,1984. p.186)-In the middle of the circular inscription a figure of plough with a yoke was incised. The inscription may indicate that it belongs to oneRatta of the Ahara of Vijayapuri. Ratta might be the ruler of a district or nadu who would be a subordinate to a Maharathi. Ahara may be a district in the modern usage. The plough might be the official insignia of the Ratta whose profession was to supervise agriculture.

There is another terracotta seal without any label inscription from Peddabankur incised with a yoked plough in the middle and flanked by the Ujjain symbol and a spoked wheel on either side.

The clearing operations of jungles for making the land suitable for cultivation were carried out with the help of flat celts of iron, hafted to wooden handles. Subsequently, a socketed axe, to be hafted with a wooden handle became vogue. A large number of sickles from the excavations were used for harvesting and also for cutting grass and weeds. The so-called hoe, found in the Satavahana sites in Andhra Pradesh and elsewhere, might not have been used as hoe alone but used as plough share as well. Some hoes from Andhra sites have thick curved cutting edges and their flaps at the butt were folded inwards to form a socket for containing the wooden handle. The curved cutting edge and the heavy weight of the implement may support the above view. A 15 cms. long and 9cms. broad spade found at Peddabankur must have been used for levelling the fields. Some anchylosed bones of cattle from excavation attest to the extensive use of oxen in agricultural operations. In addition to bones of draught animals, those of sheep, goat, dog and rodents were also recorded.

Game shooting was done with arrows provided with barbs. Among the hunted animals, deer, pig, turtle and a large variety of birds are included.

MATERIAL CULTURE

Iron objects

A vast collection of iron objects from early historical levels in Andhra Pradesh may be categorised into weapons of war or defence and implements for agricultural purposes, carpentry and household. Among the blacksmith tools, mention may be made of a terracotta forge measuring 20 cms. in diameter, a height of 19 cms and the fabric is 2 cms.in thickness. It has an oblique hole for introduction of a nozzle of bellows. There is a thick encrustation of slag around the nozzle hole inside.

The Carpenter was the most wanted artisan during the period. The walls of the buildings were raised with mud or burnt bricks, but the roof was made of wood whether it had a terraced, gabled or wagon shaped. Timber, with dense forest alround, was in plenty. The carpenter's tools include flat celts, axes, adges, chisels, drills, saw blades etc. The flat celts have sometimes curvacious and large cutting edges. They are measuring 17 to 18 cms. long and 10 cms. broad. There are also axes with shaft holes. One axe with a shaft hole have concave sides and splayed out cutting edge. The adze which is the commonest tool of the carpenter also have shaft holes. One axe measured 18 cms. long including the hole (the hole is 4 cms. in diameter). The chisels have broad blades with square or rectangular cross-sections. The butt ends are very thick. Many kinds of iron nails with flat, bent and round heads have been found. Some nails are as long as 20 to 25 cms. suggest that much of thick wood was used. The rivets have shafts of square cross-section rivetted to squarish plates on either side. There are 12 to 15 cms. long rivets.

Among the domestic implements there are choppers, knives, razors, tongs or fork, lamps, laddles, domestic trowels, balancing rods, keys, engravers or styluses, antimony rods, finger or toe rings and ferrules. The lamps have shallow and horizontal dishes about 4½ cms. in diameter with vertical handles bent backwards at the top for suspension. Among the balancing rods, the longer one measures 36 cms. thickened in the middle and tapering to the sides.

Weapons : The weapons of war and chase from Peddabankur include spear heads, lance heads spikes and arrow heads. Spear heads and arrow heads are both tanged & socketed. There is a unique spike which is 23 cms long and pointed at the top. (Krishna Sastry, 1983; p.155). It must have been hafted to a wooden shaft to be thrown against the enemy or wild animals. There is a wide variety of arrow heads-both tanged and socketed. Some arrow heads are provided with barbs (*patra*). According to Panini arrows with barbs cause extreme pain. In connection with shooting barbed shafts, he refers to two kinds of arrows namely *sapatra* and *nishpatra* barbed and unbarbed. There are also good number of arrow heads made of bone with pencil points.

Copper objects : There is a considerable number of copper antiquities of the Satavahana period which include antimony rods, stylii, finger rings, ear spools, bangles, laddles, amulets, anklets, pins etc. The so-called antimony rod is thickened at both ends and found in various sizes from 11 cms. to 16 cms. long. Sometimes one end is thickened and the other end is pointed. There are also sewing needles, tooth picks, ear cleaners etc.

Mention may be made of some copper finger rings with bezels. One of them is a plain variety, the other one inscribed in Brahmi characters which reads as 'Aralasa'. The bezels are either rectangular, almond shape or oval. One ring has a double grooved incised level design which has probably meant to ward off evils. Three varieties of amulets are noticed – one is cylindrical and the other is a squarish hollow box and the third one is a square plate. The ear spools are of two types, one is a hollow drum narrowed in the middle and the other is a solid spiralled strip of copper.

One unique find from Dhulikatta excavation is a bronze figure of "Mother and Child" or "Ankadhatri". The mother is seated on a pedestal with legs dangling down. She holds a baby in her left hand while the right hand rests on her knee. The baby touches the left breast of the mother. The hair, eyes, mouth and ornaments such as ear rings, torque around the neck, necklace, armlets, bracelets, waist band and another beaded *mekhala* are modelled in applique. On stratigraphical grounds the figure may be dated to 2nd century B.C. (Krishna Sastry, 1983: 168).

Terracotta objects : A large number of terracotta figurines have been found from various excavations in Andhra Pradesh. Some of them are hand made and others are cast out of double moulds. The crude figures or the so-called "archaic types" of bovine and human figures may be compared to those found at Kosambi, Ahichchatra (Agarwala, 1948) and Sannati (Nagarajarao, 1978) etc. The figures are hand made by modelling the clay to the desired shape. The similarity of the shape and sex of these figures found in various excavations may indicate that they represent fertility cult. The heads are made flat, the hands and legs pinched like pointed masses and the conical breasts protrude. No genitals are indicated. The face is just a featureless mass with a halo like decoration. This type of figures have a largest distribution not only in Andhra-Karnataka area but in the whole of India. Interestingly, the figures from various places in Andhra appear to have been cast on the same mould. Evidently these figures were either manufactured at one place and exported to other places or the forms copied from place to place.

The tarracotta figures cast out of double moulds include three types of female figures. The first one is modelled with outstretched hands and arms lifted. She wears a *makara* type head dress and decorated with a necklace, waist-band and kankanas etc. The flowing hair is beautifully made into a back knot at the end. This is the commonest form in the Satavahana and Ikshavaku levels. The second type is made of kaolin which appears to have universal distribution among the early historical sites of South India. The left hand of the Goddess simply rests on the thigh while her right hand holds a bunch of fruit. The parrot perched on her right arm nudge her breast with its bill. She is profusely decorated and her genitals are also marked. Sometimes she wears an *yajnopavita* and a beaded necklace with leaf pendants. This type of figures have also occurred at Sannati in Gulbarga District (Nagaraj Rao, 1978)Parrots are domesticated in the early periods to convey messages between lovers as this bird is stated to be the vehicle of God of love. In the later hero-stones we find parrots perching on the shoulders of the female counterparts of a departed hero. This kaolin figure has been found while excavating the citadel inside the Dhulikatta mud fort.

In the Artha Shastra it is prescribed that in the middle of a fort, a temple should be dedicated to the Goddess Kumari. Kumari literally means one who is unmarried, parrot being one of the attributes of the Goddess Kumari, the above nude Goddess may be the Goddess Kumari.

The third type of Mother Goddess also found at Dhulikatta holds her prominent breasts with her hands from below. She wears a beaded *yajnopavita* and other ornaments. Similar Mother Goddesses have been reported from Babylon, Elamite and Neo-Babylonian civilisations dated from 2000 years B.C., where they hold their breasts with hands. She may represent the Goddess feeding her children with milk or life juice. On one of the ivory mirror handles from a tomb near Carthage, a Phoenician Goddess is represented as holding her two breasts from below. (Krishna Sastry 1983; pp. 183-84)

There is one more interesting hand made terracotta figure from Dhulikatta. It is red slipped and polished and wears a hat-like headgear having a prominent brim with a rosette attached to the right. The eyes and ears are made in applique. The mouth is open to stimulate a laugh. The figure appears to be the mouth of a water jar. This may be a unique figure without any parallel so far found in India (Krishna Sastry, 1983, p. 185).

Pottery

Pottery is one of the most essential needs in the daily life of the common people. The entire gamut of pottery of the Satavahana period is mostly wheel made and can be classified into the utilitarian and ritualistic. The types includes storage jars, water vessels, bowls of different sizes, lids, lotas, measures, lamps, lamp-stands and dishes. From the earliest phase of the Satavahana period, we notice a profuse occurrence of tan ware besides finely polished red ware, black ware and black-and-red ware. In the later periods the tan ware gradually diminishes and the black-and-red ware looses its lustre and becomes drab.

Among the storage jars there are two kinds, namely tan ware and the red polished wares. They might have been used for storing grain or water. A squattish jar from Yeleswaram a unique specimen of its kind was decorated with incised fish-pattern at the top of the flat rim and gadrooned at the edge. Over the shoulder, tree symbols were stamped in ovoid cusps. Below there is another band of circular cusps with alternating figures of bull, horse, lion and Gajalakshmi. The jar might have been used for some ceremonial purpose. A huge storage jar from Kondapur was inscribed with a Brahmi letter on each side (Krishna Sastry, 1983; p. 190). A similar storage jar was found at Peddabankur with a height of 87 cms. and having a diameter mouth 30 cms., but without any inscription.

The collection of bowls of black and red ware is very prolific. Similarly, dishes which must have been used for taking food, are all black-and-red ware.

There are three unique black polished pyriform wine vessels (*Surabhanda*) one vessel is 2.4 cms. diameter at the mouth and the height is 18 cms. (Krishna Sastry, 1983 ; p. 194). We have a good collection of finials of terracotta which are of brick red in colour and having stepped mouldings over the body and the pointed knobs at the top. In Bharhut sculptures we notice short and long finials at the top of the door ways. Sometimes tiled huts are provided with long finials at the top. Terracotta finials are commonly found in a variety of shapes in India. Particular mention may be made of those found atKollapur, Bhita, Ujjain and Kondapur.

Among the ritualistic pottery there is a globular vase with three perforations, one at the top and two below wfth *Nandi Padas* stamped on either side (Krishna Sastry, 1983; p.195). This may represent the visage vessel the which is also known as *Mangala kalasa*. Some pots have cord impressions in the shape of letter 'ma', of Brahmi characters. Its occurrence between two swastika symbols may suggest that it is also an auspicious symbol, may be a replica of taurine symbol found on punch-marked silver coins.Several other pots were also stamped with the *Nandi Padas* or trident stand (Krishna Sastry, 1983; p. 195).

Coins

Several hundreds of coins have been collected from the surface as well as from excavations at Peddabankur, Dhulikatta and Kotilingala. From Kotilingala the coins of Kamvayasiri, Siri Naranasa, Rano Gobadhasa Rano Samagopa, Siri Chimuka, Siri Satavaha and Siri Chimuka Satavahana have been collected (Sastry, 1979; 133-39).

The coins pertaining to Kamvayasiri contain symbols of a bow and arrow, swastika and the legend reading as Kamvayasiri on the obverse. The reverse show four *Nandi Padas* facing opposite directions.

The coins of Siri Nara Nasa contain a tree and an elephant with the legend at the top on the obverse; a trident or *Nandi Pada* inside a pavilion like frame with a rayed circle at the top, on the reverse.

Rano Gobadha coins have a three arched hill below and the legend above and the reverse is blank. On some of these coins a bow and arrow appears on the opposite corner to the three arched hill. On other coins of this type there is a tree in railing and the Brahmi letter 'ma' (or taurine symbol) which is simplified early form of *Nandi Pada* as noticed on the Megalithic burials at Chagatur in Krishna-Tungabhadra Valley, besides the legend Rano Gobadha. One more coin of the same king contained a dotted wavy line at the bottom, the legend in the middle, and the bow and arrow at the top.

There is an interesting coin of Maha

Talavarasa with a horse and a wavy line below on the obverse while the reverse contains a three arched hill, wavy line and a pipal tree.

The coins of Siri-Satakani contained the figure of an elephant with an upraised trunk on the obverse and the Ujjain symbol dotted by Swastikas on the reverse.

The coins of Rano Samagopa contained a three arched hill, a tree in railing, a rayed circle, triangular headed standard bow and arrow, taurine symbol (letter 'ma'). Sometimes the Samagopa coins bear a rayed circle and a bull with the legend on the obverse. Other coins of the same king have the three arched hill, a triangle headed standard, the Brahmi letter 'ma' or taurine and with the legend Samagopa in the middle on the obverse; and four *Nandi Padas* on the reverse.

The coins of Chimuka contained an elephant with a hanging trunk, a pedestalled trident (*Triratna*) in the middle and a legend above reading as 'Siri Chimuka Sa.ava'. The reverse contains an Ujjaln symbol and Swastika marks.

There is an interesting coin of Siri Satavahana with a triangle headed standard, an Ujjain symbol, clock-wise Swastikas, with the legend 'risatavahana' on the obverse. Below the legend there is a tree. On one of the coins, a three arched symbol on the obverse and two tridents on the reverse facing each other is worth mentioning.

Among the collection of coins at Kotilingala mention may be made of one coin belonging to Mahasenapati (sa)gamana Sabhakasa.

I now discuss the relative depths in which the coins were found at Kotilingala and Dhulikatta. A coin of Mahatalavara was found at a depth of 1.68 mts. at Kotilingala, a similar coin of Mahatalavara was found at a depth of 0.95 cms. at Dhulikatta.

The lowest depth at which the coin of Samagopa was found at Kotilingala was 1.68 mts. while the same type of coin was found at Dhulikatta at 1.20 mts. The coin of Gobadha was noticed at 1.30 mts. depth at Kotilingala. However, no coin of Gobadha was reported at Dhulikatta. A coin of Satavahana was reported at a depth of 1.38 mts. at Kotilingala whereas it was found at a depth of 1.35 mts. at Dhulikatta. But the coin at Dhulikatta bears only a short legend Sirisata. The coin of Naranasa was encountered at Kotilingala only at a depth of 30 cms. The coins of Chimuka Satavahana or Siri Chimuka were found from varying depths from 12 to 35 cms.

Summing up it may be tentatively concluded that the coins of Mahatalavara were the earliest, succeeded by those of Sama Gopa, then Gobadha and Satavahana. Above the level of Satavahana the coins of Narana are noticed but this is subject to confirmation in future digs. The coins of Chimuka are are probably the latest.

In this connection, mention may be made of the coins recovered from Chandravalli excavations in Chitradurg taluk of Karnataka (Wheeler, 1948; pp. 288-95) by Mortimer Wheeler. Altogether 13 layers have been identified in the excavation. Layers 13, 12 and 11 were attributed to the Megalithic culture and layers 10 to 3 to the Andhra culture. The coins of Yana Satakarani were found in strata 5 and 6, whereas the coins of Sadakana Kalalaya Maharathi came from strata 7 to 9 i.e. below the stratum assigned to Satavahanas. As each, the coins of Maharathis are earlier than those of the Satavahanas.

The Andhra-Karnataka (Rama Rao, 1974) region must have been ruled by the Maha Talavaras and Maharathis, either as independent sovereigns or feudal lords under the imperial Mauryas. After the Satavahanas established their suzerainty over the Deccan the Maharathis and Mahatalavaras must have faded into oblivion. However, further research on this aspect may throw more light. Comingback to Andhra, Veerapuram excavations (Sastry, 1981),(Kurnool district) yielded a good number of coins belonging to Sadakanaputa, Maharathisa, Mahatalavara, Maharatiputasivala Maharathisa Siva Maha Hatasa, Maharathisa Kada Porihalasa, Maharahtisa Siva Khadasa etc. There is also a solitary coin of Sada Kana Kalalaya.

The excavator of Veerapuram feels that these coins were contemporary to the Satavahanas. However, an examination of the stratigraphy indicates that the Maharathi coins were found in earlier levels than Satavahanas.

Just as the waters of the sacred rivers Bhima, Krishna and Tungabhadra tha emanate from the uplands of Karnataka flow through Andhra and fertilised its lands, the various cultural strains from times immemorial have traversed from Andhra to Karnataka and vice versa. Yet, the long rule of the Satavahanas over these two regions has left behind a strong cultural impact which survived till this day.

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33. THE EARLY HISTORICAL PHASE IN THE HISTORY AND ARCHAEOLOGY OF KARNATAKA

S. Nagaraju

The present essay is an attempt to review the nature and the problems of the study of the early phase of history and archaeology of Karnataka as a distinctive cultural phase. In the context of Karnataka, the cultural phase succeeding the megalithic is deemed to be of the early historical period by the archaeologists. The evidences provided by the archaeologically well documented sites, like Brahmagiri and Maski, show that this phase commences around the beginning of the Christian era and extends to about 2 or 3 centuries hence, thus corresponding roughly to the latter part of the Satavahana rule. The excavations conducted at Banavasi, Vadgaon Madhavpur have added in recent years a little more information about this phase apart from what had been gathered previously from the excavations at Brahmagiri, Chandravalli and Maski. To a proper understanding of the complexities of cultural formation during this period it is not sufficient to study only the metropolitan sites as above. It should be possible for us to have a better view taking into consideration the interaction between the metropolitan centres and the various smaller towns and villages which acted as the economic hinterland for these centres. In this connecction practically no work has been done, though we may consider two small scale excavations, which were done not for the understanding of the Satavahana or early historical culture but to understand the earlier cultures. These sites are Hemmige (Mysore district) and Piklihal (Raichur district). Besides, for an understanding of this period there are about 40 inscriptions, all in Brahmi script and Prakrit language. Out of these practically 33 come from a single site Sannathi, (Gulbarga district). The others are stray inscriptions coming from Vadgaon-Madhavpur (Belgaum district), Vasana (Dharwad district), Banavasi (North Kanara district) Malavalli (Shimoga district) and Hiremagalur (Chikmaglur dist.). Architectural works of the period are known from only the excavated sites mentioned above and all of them are brick structures. There are also a few sculptures of this period mostly coming from Sannathi and sorroundings and a few from Banavasi and Togarsi. Besides, the metropolitan sites like Chandravalli. Maski, Vadgaon-Madhavpur, Banavasi and Sannathi have yjelded a good number of terracotta figurings. The numismatic evidences too is quite good. From the various above mentioned sites a large number of coins mostly of lead and potin have come forth, both from excavations and surface collections. It is this body of archaeological evidences which provides the major data for our understanding of the culture of the early historical period which would be reviewed and discussed presently.

The concept of Early Historical Period and Early Historical Culture: History Vs Archaeolcgy :

Before entering into the discussion of the nature of cultural features, it is necessary for us to have a clearer understanding of the chronological span of this phase. For archaeologists, the Early Historical phase practically commences only from about the first century B.C. at the earliest, because of the association of this phase with the various above mentioned artifacts and of the well-known Russet Coated Painted Ware (RCPW) (Andhra Ware). But for historians, Karnataka enters into the historical era from the time of Asoka himself. (Nagaraja Rao, 1978; p.8). Now we have atleast 7 sets of

Asokan Inscriptions from the districts of Chitradurga Bellary and Raichur (Brahmagiri, Siddapura. Jatinga Ramesvara, Udegollam, Nittur, Koppal and Maski). In fact, the occupation of Karnataka by the Magadhan powers is an important landmark in the history of this region. With the appearance of the inscriptions of Asoka, a new tool, the written records, appear as a source for historicalreconstruction.It appears that the occurrence of writing is a phenomenon associated with a number of changes that must have come up in the region in the social and economic structures of the community. Besides, the changes in the socio-economic system consequent on the establishment of a well organised political system in a region inhabited by tribal and peasant communities without any recognizable state-apparatus is an important sociological problem that deserves proper investigation. So this point of time should be taken as the water-shed between pre-history and history. Similarly with regard to the point of time to be taken as marking the end of this period, there has been no clear opinion. Archaeologists would believe that the end of the phase yielding the Russet-coated painted ware (RCPW) would mark the end of early historical period. But even this is not clearly stated anywhere. Otherwise we may also take into consideration the other major evidences of this period viz. that of inscriptions. It is known that Prakrit was the language of early inscriptions and somewhere from about the 4th century A.D. (Panchamukhi, 1953; p. 137). Prakrit went out of use and was replaced for all official records by Sanskrit. This also marks in a way an important change in the political history of Karnataka wherein we find the rise of indigenous, local kingdoms as the Ganga and the Kadamba. Taking this as the other end of the early historical period we may roughly have an idea of the span of this period from c. 300 B. C, to c. 400 A. D. i. e. roughly about 7 centuries. So, the early historical phase as commonly understood by archaeologists covers only the latter part of the above time span.

So, it is now felt that this anamoly should be set right. It is necessary that we are t recognize atleast two major phases within long span of 700 years. The first phase c. 300 B. C. to c. 100 B. C. and then 2nd stage c. 100 B.C. to c. 400 A. D. It is with regard to these phases that we have to speek proper archaeological data which could fruitfully supplement the historical data available, for a better understanding of the historical process in that early period.

The first phase of the Early Historical Period.

The chronology of early historical cultures in Karnataka has largely depended upon Wheeler's reconstruction on the basis of the Brahmagiri and Chandravalli evidences. Wheeler first thought that the three distinctive cultural phases recognized at Brahmagiri should be chronologically ordered as follows (Wheeler, 1947; pp.180-310):

Period I Neolithic culture 1000 B.C. – 200 B. C.

Pericd II Megalithic culture 200 B.C.-100 A. D.

Perlod III 'Andhra' culture 100 A.D.-300 A. D.

However, the inconsistancy of this chronological scheme was pointed out by Heimandorf who considered that the Neolithic peasants of Brahmagiri could not have been the people for whom Asoka addressed his inscriptions, which would be so, by implication, if Wheeler's chronology is accepted. In Maski, another site near which Asoka's inscriptions exists, the excavator intelligently escaped tackling this problem of finding a culture contemporneous to the inscriptions of Asoka by taking shelter under the gap between the neolithic and the megalithic phases. In a review of this situation Sundara was also a little hesitant in altering this chronological scheme substantially, though he hinted at the possibility of RCPW being much earlier than the date ascribed to it by Wheeler (Sundara, 1975). If we are interested in finding the nature of culture and the various cultural transformations coming up from the appearance of a well organised political system under the Mauryas, it becomes imperative to identify in the archaeological context the cultural phase representing the period of Mauryan rule in Karnataka.

This problem has been tackled to some extent in the neighbouring Maharashtra in sites like Brahmapuri,Nevasa and Nasik. The excavators have tried to date the phase into two sub-periods calling them as early historic and Indo-Roman, the latter demarcated clearly with the occurrence of Roman antiquities. A similar chronological ordering of Karnataka cultures in distinctive phases has not been easy.

As stated above, identification of cultural deposits of the Mauryan period stratigraphically even in the well excavated sites Brahmagiri and Maski is not definitive. In this context, it may be worthwhile to change our approach from stratigraphical indentification to distributional pattern, i.e. to identify such cultural traits found commonly in all the settlements lying close to the Asoka's inscriptions in various places. Significantly, atleast in two localities viz. Koppal (Raichur district) and Erragudi (Kurnool district) where Asoka's inscriptions have been found (Sircar, 1975 p.28), Archaeologists hava been able to recognize the nearby habitations as yielding only the Megalithic black-and red-wear, examination of the habitations near other places with Asoka's inscriptions particularly Nittur and Udegollam and a detailed excavation of one or two single culture sites would be highly rewarding. However in the light of the current evidence from the above two sites (and also from the stratigraphical positions of the cultural phases at Brahmagiri and Maski), we feel that it is better to consider that the Megalithic culture was the one which was flourishing during the time of Asoka.

This recognition of the Megalithic culture as the one contemporaneous with the Mauryan rule in Karnataka leads to innumerable, but pertinent, questions. Now that iron technology and megalithicism are known to have a longer history in the region, going back to atleast six or seven centuries before the advance of Magadhan imperial regime here, the immediate questions that arise would be, what was the social, economic and cultural situations of the pre-Mauryan iron age in Karnataka?;is it possible to identify within the megalithic culture a distinctive Mauryan phase?; and is it possible to trace the nature of changes brought forth by a superior political apparatus of the Mauryas in a region which was possibly in the pre-State or premitive state stage earlier ? Complimentary to these are, what was to set its eye, how its political authority was exercised, what was the attraction in this region for the Magadhan imperial power here and what happened immediately after the cessation of imperial control with the decline of Mauryan power, etc. Many of these questions are easy to to ask than to answer at the present stage of research, but could rather become fruitful lines of enquiry in the future organisation of research programmes both by archaeologists and historians.

However, at present at best, we may speculate on a few of these questlons basing on the currently available, but inconclusive data with reference to the study of megalithic culture in Karnataka, the first serious attempt to order chronologically its various phases(Sundara,1975; pp. 188-226.)

This too, is concerned more with finding the chronology of the megalithic types than recognizing the changes in other spheres of human activity. But his identification of the Brahmagiri type as belonging to the period around 3rd or 2nd century B.C, is of interest. Besides the type of funerary architecture many other components of the stage too could be fruitfully utilized to identlfy contemporary archaeological data from other regions of Karnataka.

Equally of great significance is (Leshnik, 1974) to understand the megalithic culture within a conceptical framework, the results of which have a degree of utility, though some of them are disputable, in approaching both the initial and the subsidiary questions posed above. He has surmised that the socalled Megalithic culture is not a distinct culture or a period or a region, but it only represents the cultural pattern of a small nomadic group which interacted with the local peasant communities. He made a significant observation that no where in any of the excavated habitation sites there is a distinctive occupational deposit yielding the Megalithic artifacts only. Whether it is Brahmagiri or Maski or elsewhere the Magalithic material was found either mixed with the neolithic artifacts or with the early historical materials. Further he also made it clear by an examination of the typology of iron tools that there is a close resemblance between these iron tools and those found in Northern Indian sites datable to the centuries before commencement of the Christian era. The point he was making very clear is that the so-called Megalithic culture is just a preference of a particular group of people who were engaged in manufacturing and marketing weapons and whose wares reached both Northern India and Southern India.

This conceptual model of a nomadic community interacting with local settled communities, is of interest and clears some perplexities in our understanding of the megalithic culture. But it also poses some further problems when viewed from the background of other anthropological models for the process of cultural growth.

Did not this new iron-technology bring in changes in material culture with the introduction of more efficient modes of production, and the consequent change in social formation introducing stratification between those who could control the source of production through their higer technological know-how and those who could not ?. This problem deserves a serious investigation through the recognition of megalithic complexes indicating definite social and economic differences in architecture and in the composition of the grave goods. Another point of interest in this regard is the role and extent of impact of iron technology in improving the efficiency of productive economy. While a number of megaliths yield only weapons of war, the presence of agricultural implements and craftsman's tools in a few others is quite revealing. Could these differences be systematically ordered in accordance *with* age-area co-ordinates ?

Some of the Megaliths which are datable to the pre-Mauryan period, yielding mostly iron weapons, are inidicative of the existence of a class engaged in war or police functions. Anthropologists feel that war and police functions are the central activities of the state-machine. If so, is it possible that some type of political organisation-the tribal-state, or the early looselyknit tertitorial-state had already began in Karnataka in pre-Mauryan times ? In the neighbouring Tamil Nadu, it was already so, the and Chera, Chola and Pandya had gained a status to be referred to by Asoka as territories lying beyond his own. A few other groups like the Kosar referred to in Sangam literature as to have been associated with Mauryas, and the Satiyaputas and others referred to in Asoka's inscription (Sircar, 1975) could be such political/tribal, entities which could possibly be associate with Karnataka. Even without referring to the names, there is sufficient reason to believe that some such early political/state formation could have been present in Karnataka in pre-Mauryan times. It would be of interest if it is possible to recognize such tribal/territorials groups from archaeologica evidence on the basis of distributional pattern of cultural trait elements.

The recognition, (Leshnik 1974) of the occurrence of common types of weapons in South Indian megaliths and the early historical sites of Northern India leads to another interesting possibility,that the iron products manufactured here may have found markets in Northern India, possibly through the intermediaries. The rich source of iron and the technological know-how present here itself could be one of the causes for the rising Magadhan empire to set its eye on Southern India. Further the concentration of Asokan inscriptions in a belt stretching from Koppal to Erragudi is again revealing: this also happens to be the auriferous geological belt, wherein gold mining was in vogue from much earlier times and this would also cover the rich diamond sources from the eastern part of this belt. These possibly explain two things: the reason for the rising Magadha to endeavour to include this territory within its empire, and also, possibly why did not thrust beyond to Tamil Nadu. This is quite in accordance with the perseption of Kautilya about the importance of Dakshinapatha as a rich source of mineral wealth. The establishment of a provincial capital at Suvarnagiri (Erragudi) substantiates this picture.

How far the imposition of imperial rule over this region and the inevitable increase of contacts with Northern India brought in changes during this period is yet to be properly investigated than speculated. As for as this period is concerned establishment of better communication net-work to facilitate military movement, administrative control and trade-flow, and the consequent movement of ideas and people could be visualised, but not clearly established from the available data at present. However, a better picture emerges in the succeeding period.

Early Historical Period-The Second Phase

During this period, the region witnessed a definite change in the socio-economic structure from the previous village economy to gain identifiable traits of urbanization. Settlements with different socio-economic structure like cities, towns and villages begin to appear distinctively, but with a certain degree of economic interdependence as could be expected in such a situation.

The interdependence and consequent contacts among the settlements with varied economic status brought in some amount of uniformity in the cultural pattern as can be seen from the similar basic material equipment that were in use throughout the area. A characteristic element that appears in most of the sites of the period is the Russet Coated Painted Ware (RCPW) (sometimes, but wrongly called Andhra Ware). Pots made of simple black and red-ware, red slipped ware, black slipped ware, dull black, red and grey wares are also of common occurrence throughout. Dish and bowl are the types common to all wares, but larger vessels and a few miniature vessels are seen only in the dull wares. Other commonly used items were objects of of every day use like balls (corn crushers), pestles and flesh rubbers made of locally available stone, tanged knives, chisels and possibly sickles and such items of iron, as well as terracotta beads and shell bangles used for personal decoration. Copper objects like bell and rattle appear to have been used, but rarely.

Considering the extent of the settlements as well as their components to a certain extent it is possible to classify them into different categories like cities and towns. Sannathi, Banavasi, Vadgaon–Madhavpur and Chandravalli are sufficiently large settlements each covering an area of more than one or two sq. kilometres. There are nearly two hundred known settlements, like Hemmige, Piklihal, Tadakanahalli, which cover a very small area and such may be considered as villages. Sites like Brahmagiri, Maski, Hirekal occupying a middle place in this regard could be possibly considered as lesser cities or smaller cities or towns. Differences in the standard of life in these types of settlements can be noticed in the nature of material equipments seen in them. For example in pottery itself, several sites like Brahmagiri, Chandravalli, Maski, Banavasi, Vadgaon-Madhavpur and Sannathi, have yielded dishes of Rouletted ware and Amphorae of Mediterranean origin, while these are generally absent in smaller 'VIllage' sites (e.g. Hemmige). Beads of Carnelian, Jasper, Lapis lazuli crystal, chalcedony, amethyst, agate, garnet, coral, glass shell and paste, besides terracotta, are to be seen profusely in these sites, thus revealing the greater wealth and preferences of the 'urban' populace. The distinction between the smaller settlements and cities is all the more glaring in achitecture. While in smaller settlements thatched huts appear to have been common (as evidenced by few post holes, as at Piklihal), somewhat larger towns could probably boast of subtantial structures.

Pieces of flat grooved tiles with a hole at one end found in many sites reveal that these were used for covering the roof. At Brahmagiri an apsidal structure has been found. At Maski a few brick bats show the existence of brick structures. But the cities like Banavasi, Sannathi and Vadagaon-Madhavpur had more substantial structures. Sannathi had a rectangular citadel on an artificially elevated mound, besides an outer fort wall running to a length of more than 2 Kms and enclosing the town and the citadel. Banavasi had a fort enclosing an area of more than a square kilometre. Two large apsidal structures have also been found at Banavasi (IAR, 1970-71; pl. XLV). At Sannathi, remains of at least four stupas are known. (Nagaraja Rao, 1978, p. 29) The excavations at Vadgaon–Madavpur have revealed residential structures built of brick, usually consisting of 3 or 4 rooms surrounding a central hall and few religious structures (Sundara, 1981; pp. 91-92), Other civic amenities too appear to have been present in these. Brick lined circular wells are known from both Banavasi and Vadgaon-Madhavpur, besides a structure identified as a soakpit and a metalled road at the latter place. There is evidence of a covered brick drain at Chandravalli and metalled road at Brahmagiri.

These differences in the culture components of settlements are evidently of course ndicative of their differing economic statusi too. The villages, larger in number, formed the backbone of economy with primary activities like agriculture and rearing animals. Not much is known of the crops grown or the method of agricultural operations. But it could be presumed on the basis of cultural overlap between the Megalithic and the Early Historic that the earlier methods continued. An iron object from Brahmagiri is identified as a coulter, an agricultural implement of Roman origin. Though anew item, this appears to have been a rarity. As for the crops, Rice was being grown is known from the occurrence of rice grains in a storage bin at Vadgaon-Madhavpur. But it is interesting to note that from contemporary sites in Maharashtra and Andhra Pradesh, good evidence has come forth in recent years for the cultivation of Wheat, Rice, Ragi, Jowar, Horse-gram, Common pea, Black gram and Bengal gram. Remains of cattle sheep and goat commonly seen in many sites reveal the types of animals raised. Buffalo, however, appears to be a new inclusion to the farm.

The towns were more prosperous. Theirs prosperity was dependent mainly on trade. The discovery of Satavahana coins in places like Chandravalli, Banavasi, Vadagaon-Madhavapur and Maski as well as the spread of various items like beads and bangles of common variety in distant sites are indicative of the commercial activities. Beads of lapiz lazuli and coral, and bangles made of shell must have come from distant places. The process should also lead to the impact of ideas and habits from different regions. One item of interest is the occurrence in many sites of Karnataka of a flat bottomed bowl with flaring sides, a variety which occurs profusely in the Kushana levels in Northern India. The discovery of Roman coins, Rouletted ware and Amphorae are evidences of trans-oceanic trade contacts too. Coins of Augustus, Tiberius and Claudius have been discovered variously at Chandravalli (Wheeler, 1947 ; p. 287) and Bangalore (Lewis Rice) (Yashavantapur and Jalahalli). Recently a hoard of Roman and Byzantium coins has been reported from Akki Alur (Nagaraj Rao, 1978 ; p. 45) in Dharwar District. The sites like Banavasi, Sannathi and Vadagaon-Madhavpur appear to have been seats of administration (with their fortification etc.) as well as commercial centres.

The archaeological data, as available now, does not provide clear clues to get a picture of social structure of the period. But on the basis of epigraphical and other data it may averred that the economic status attained by different occupations may have determined the social status too. While the agriculturists and craftsmen could be deemed to have been in the lower rung of the social strata, the businessmen and the administrators may have occupied a better position. The latter classes which enjoyed more leisure and wealth could also have been responsible for encouraging sophisticated cultural activities. Thus, it is seen that in cities like Sannathi and Banavasi only, there is evidence of sophisticated art. Sannathi has yielded large number of stone sculptures and one piece is known from Banavasi. Terracotta figurines have been found in sufficiently good quantity in the city sites of Sannathi, Banavasi and Vadgaon-Madhavpur.

Sophisticated religious hailing from northern India may have had some following in the urban centres. The apsidal structures at Banavasi. Brahmagiri and Vadgaon-Madhavpur are generally considered to be Buddhist. An inscription from the former place refers to a Buddhist vihara. Sannathi has clear evidence of the presence of Bhuddism in the stupas, the sculptures and a number of inscriptions found there. An inscription from Vadgaon-Madhavpur mention the performance ofthe *Agnisthoma* by a Brahmin. A vessel of peculiar shape found in a Early Historical site at Itgi (Dharwar District) on the bank of Tungabhadra is identified as a vessel used in a vedic sacrifice.

It is extremely difficult to have a clear idea of the religious situation of the larger populace in the villages. Most of the village sites are devoid of any evidense. Probably the folk religions could have been in practice.

Despite the continuous impact, for more than 2000 years, of sophisticated religions like Vedic and Puranic Hinduism, Jainism, and Budhism, fold religious elements still persist strongly in the present day villages of Karnataka. This would have been all the more so in an early period. It is not unlikely that Megalithicism too persisted in some pockets, though it had gone out of vogue generally. The Megaliths at Jadigenahalli are dated to about the early centuries of the Christian era.

Generally, it may be stated that the Early Historical period set in a new trend in the cultural development. While the basis of rural economy continued from the Megalithic stage, newer elements are noticeable in the beginning of urbanization and consequent socio-economic change. Sophisticated religions of Northern Indian origin (and in turn ideas and practices too) begin to make their appearance here. For the first time new art traditions commence. While many of these are triggered by the new wave of culture flow as a result of this region coming under a larger cultural political net work during these Maurya or the succeeding Satavahana regimes, Karnataka still appears to have retained its cultural identity to manifest itself with the formation of indigenous kingdoms around 400 A. D. by the Gangas and the Kadambas.

34. ROMAN ANTIQUITIES (INCLUDING COINS) IN KARNATAKA-MAHARASHTRA

C. Margabandhu

Considerable studies have been undertaken during the last three decades or so, ever since Mortimer Wheeler's excavations at Arikamedu (Wheeler, 1946) and his epoch-making discoveries of Roman finds in stratified contexts followed by further excavations at Brahmagiri and Chandravalli (Wheeler, 1947-48) highlighting their cultural significance for the first time in pan-Indian context of the finds in South India and fixing a tentative, yet firm chronology with contemporary cultures prevailing locally. The whole body of evidence of the numismatic data of Graeco-Roman types found in Indian sites including those from Pakistan and Afghanistan was further assessed by him by laying down a historical chronology of the commercial contacts, the trading centres, local marts and coastal towns and also the trade routes in those regions (Wheeler, 1951; pp. 345 ff), connecting them. This was further given an historical base in his 'Rome beyond the Imperial Frontiers' (Wheeler, 1954; pp. 141 ff) which was the latest data on which more discoveries were added from time to time. Deshpande in his analysis of the 'classical influence on the Indian terracotta art' (1965; pp. 603-10) and 'Roman potteries in Ancient India' (1968; pp. 275-284) brought out the major significance of the ceramics and the artistic objects with Graeco-Roman characteristics found in the sites contemporary to Satavahana period. Karl Khandalawala (1960; pp. 29 ff) and Sankalia (1957; pp. 207-08: 1960; pp. 110-23) in their study of the copper-bronze hoard from Brahamapuri and Kondapur finds of Roman amphorae and the nude goddess figurines respectively brought to lime-light. Some concrete evidence of Graeco-Roman craftsmanship that left indelible impressions on Indian scene. The present author (1965; pp. 316-22; 1983; pp. 185-202; 1985; pp. 79-80, 132-35, 310) has further added a fillip of the literary data and also the latest archaeological finds of the trade contacts between Western India and the Graeco-Roman world from the first century B. C., and the second century A. D. by assessing their significance and also interconnecting the archaeological evidence known from South, Central and Western India, in contemporary contexts. A brief, but general summary has also been made recently by A. K. Singh (1983;pp 140-74) of the finds of Roman pottery to date.

All these data pertain to the problem in an all-Indian context with an emphasis on regional variations arising out of the finds discovered from time to time. In assessing the evidence in a regional setting such as in Karnataka-Maharashtra, it is quite natural that finds in the area have a connecting cultural link with those found in the neighbouring regions and therefore, while discussing their significance, a comprehensive view will be attempted. Much of the data finds have been briefly catalogued by earlier scholars in the field and hence as far as possible repetition will be avoided by referring to them, unless otherwise they have some topical value to the matter under discussion.

During the last three decades, numerous excavations have been carried out in historical sites which have yielded finds identifiable as of Graeco-Roman origin in Southern Peninsula including this region viz., Karnataka-Maharashtra (Fig. I). They are Arretine Ware, Rouletted Ware, Megarian and 'Samian' Ware, Amphorae, coins and coin bullae, lamps, bronze figurines and

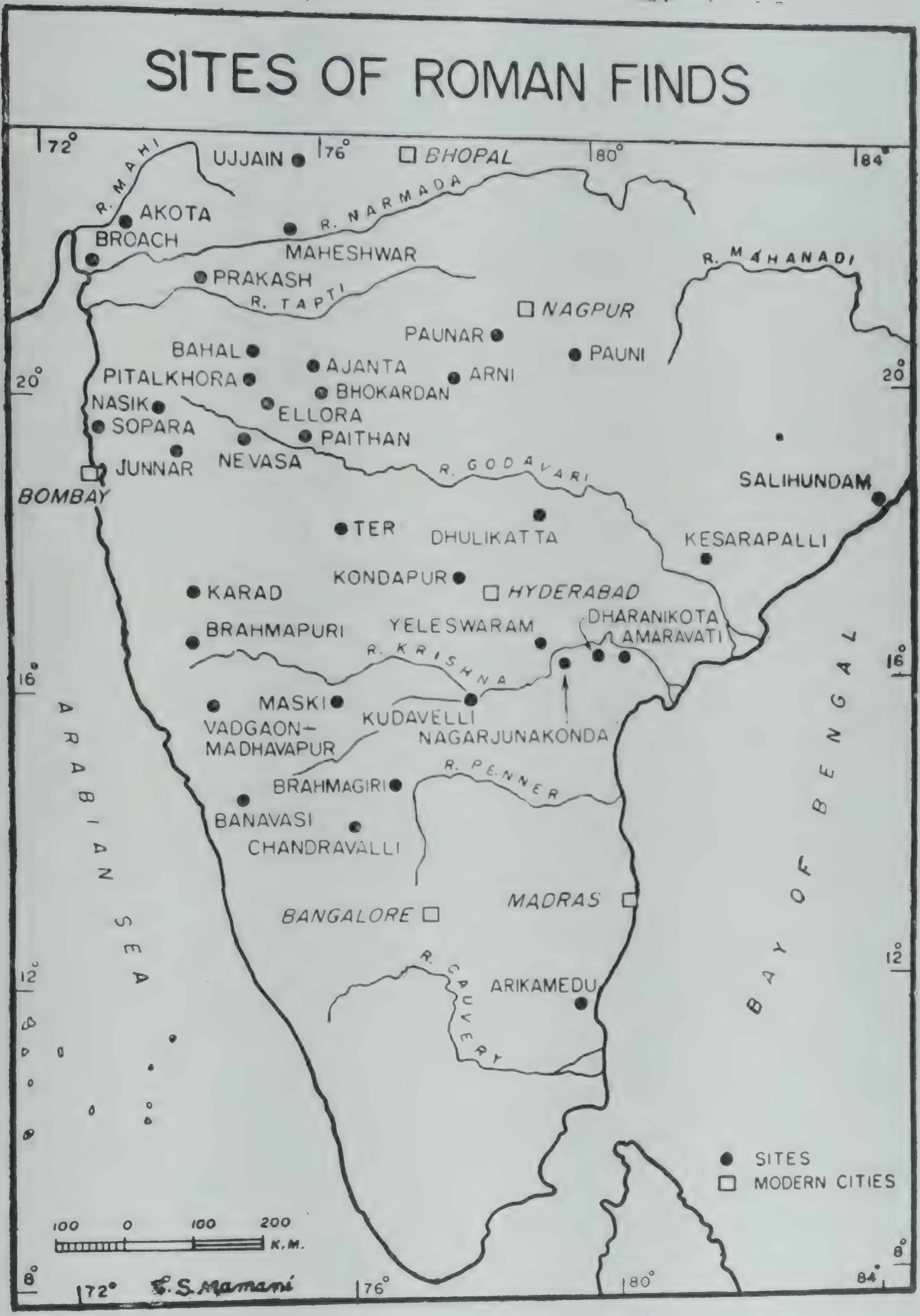
SITES OF ROMAN FINDS
72°
76°
80°
84°
20°
16°
12°
8°
R. MAHI
UJJAIN
BHOPAL
AKOTA
BROACH
R. NARMADA
MAHESHWAR
R. MAHANADI
PRAKASH
R. TAPTI
NAGPUR
PAUNAR
PAUNI
BAHAL
AJANTA
ARNI
PITALKHORA
BHOKARDAN
NASIK
ELLORA
SOPARA
PAITHAN
JUNNAR
NEVASA
R. GODAVARI
BOMBAY
SALIHUNDAM
TER
DHULIKATTA
KESARAPALLI
KONDAPUR
HYDERABAD
KARAD
DHARANIKOTA
AMARAVATI
BRAHMAPURI
YELESWARAM
R. KRISHNA
MASKI
VADGAON-MADHAVAPUR
KUDAVELLI
NAGARJUNAKONDA
R. PENNER
BRAHMAGIRI
BANAVASI
CHANDRAVALLI
MADRAS
BANGALORE
ARABIAN SEA
BAY OF BENGAL
R. CAUVERY
ARIKAMEDU
SITES
MODERN CITIES
100 0 100 200
K.M.
S.S. Mamani

Fig. 1

vessels cameos, caltrops and gems. In addition Red Polished Ware, Kaolin Ware and figurnes. double moulded terracotta figurines, lamps and others with non-local features were also traced to the some source of inspiration, whereas they were produced locally catering to the needs of a special kind. Not all of them have been found in this region. Except Arretine ware, cameos and gems, most of the others have been reported. Some of the typical and characteristic ones are also found to have been imported initially. This is more so in respect of Arretine Ware, Amphorae, Rouletted Ware, coins, gems and bronze objects.

It is proposed to consider and discuss the finds in the order of frequence of their occurrence, so that typical of them could be highlighted. The importance of the places of their finds and also their viable situation, the reasons for their prominence as centres of industry and commerce will also be considered with a bearing on the raw-material or manufactured goods which were found at those places.

Arretine Ware

It is a red glazed pottery, but occasionally the glaze turning to yellow with red streaks or veins. Identified for the first time at Arikamedu, it was current during the last quarter of the first century B. C. to the first half of the first century A. D. and it was named after the place of manufacture (Arezzo) in Italy. Fifty sherds were found at Arikamedu, of which four of them bore potter's marks (Wheeler, 1946; pp. 40–3; pl. XXIII. f. 5). Apart from this place Kanchipuram (Ramachandran, 1980; p. 95), Uraiyur (IAR, 1964-65; pp. 25–6) in Tamil Nadu and Dharanikota in Andhra Pradesh (IAR, 1964–65; p. 2) wherein Arretine Ware has been identified. It has not been reported from other places.

Rouletted Ware

This is a characteristic ceramic developed out of the technique of impressed decoration prevailed in Hellenistic period, which comprised of revolving a toothed nail on the wet surface of the pot and producing pricked decoration of symmetrical type. At Arikamedu, (Wheeler, 1946; pp. 45-8) it was identified for the first time in stratified levels, as early as the end of the first century B. C. or the beginning of the first century A. D. It is seen to be stratigraphically and chronologically co-extensive with the Amphorae, though it is found in much greater abundance. The type and shape of vessels are quite few which consist of flat dishes with incurved rims and shallow bowls. The rouletting marks were found in the interior in the form of concentric lines and in bands.

A variety of designs were executed exhibiting different types of sets of patterns. Some of the typical of them are minute triangles, diamonds or parallelograms; wedges, crescents, ovals or dots, etc., of these the triangles are the most common and occur in all strata.

A large number of sites in Karnataka-Maharashtra have yielded Rouletted Ware, They include Arni, Banavasi, Brahmagiri and Chandravalli, Maski, Nasik, Nevasa, Ter, etc.

The typical shape is beaked dish reported at Brahmagiri and Chandravalli (Wheeler, 1947–48; pp. 236–37, 277–78). Designs at the latter were executed inside with rows of patterns of concentric smoothed bands in place of rouletting. Brahmagiri has yielded this ware in typical variety with rouletted designs in double rows of patterns corresponding to Arikamedu specimens. Beaked rims of dish have also been reported at Kondapur (Dikshit, 1952; p.v.) and Maski (Wheeler, 1947-48; p. 308; Thapar, 1957; pp. 76-77). The ones from the former bear decorations of the concentric rings at centre.

Banavasi (IAR, 1970-71 ; p. 29, Narasimha Murthy, 1974; p. 289; 1983; pp. 45-46) has also yielded large quantities of Rouletted Ware, though it is of inferior quality.

Nasik and Ter have yielded Rouletted Ware with typical patterns executed inside the vessels. The shapes consist of dish and bowl at Nasik (Sankalia and Deo, 1955; pp. 69-70, f. 42) with polished black surfaces and in some, the greyish outer core is also visible in places whereever broken. They are similar to Arikamedu specimens (Wheeler, 1946; pl. XXV. 8.8). At Ter (Chapekar, 1969; pp. 62-63; F. 18-20) the ware has smooth light grey surface with compact grey core giving almost a metallic sound. Most of them have been made locally, since they are of inferior quality.. But the designs consisted of concentric bands, rows of shallow ovals and parallelograms with the fine consistency. **They are ascribable to the times coeval to** Satavahana period. Nevasa (Sankalia et al., 1960; p. 280) has yielded a base of dish with compact core, black polished and smooth with traces of concentric designs in the interior.

Rouletted Ware with typical designs have been reported extensively in sites of Southern Peninsula and South-east coast. Notable among the sites in Tamil Nadu which have yielded the Ware include Kanchipuram, Kaverippattinam, Nattamedu, Sengamedu, Uraiyur, Vasavasamudram and a number of sites in the Cauvery valley. Further towards South-east coast its occurrence is extensively reported especially in sites of coastal Andhra Pradesh (Deshpande, 1968; pp 277, 282) such as Amaravati, Dharnikota, Dhulikatta, Kesarapalle, Kondapur, Nagarjunakonda, Salihundam, Sattanikota, Yeleswaram, etc. Among them Salihundam has yielded a rich variety of them (Subramanyam, 1964; p. 412) with numerous designs and symbols executed inside the base of dish and bowls, wherein the evidence attests to an earlier origin on the east coast. One sherd at Kesarapalle has been riveted with an iron pin emphasising its rare value.

The consistency of the finds of the ware in Karnataka-Maharashtra and their similarity to those found in South-east coast, e.g. Arikamedu-reveal the close nature of the movement of the wares and spread by trade which is also testified by close chronology of their occurrence in a limited time scale. Its further spread to other regions could be postulated from this area of larger concentration steadily supported by commercial contacts in the regions of the west. and south.

Megarian and Samian Ware

Apart from direct import of Arretine ware, there were other fabrics which came to be manufactured following the Graeco-Roman influence. They are called by their generic names, Samian and Megarian. Samian ware together with Arretine form the best known class of Roman pottery; the former is the provincial equivalent of Arretine (Oswald and Price, 1920). Though in Indian context they were otherwise represented in imitative shapes and many local types of them especially with stamped decorations occur at Bhokardan, Nasik, Nevasa and Ter datable to the latter part of the first century A.D. Many of them at Nevasa (Sankalia et al, 1960; pp. 308-11, figs. 142, 143, 151). called Megarian Ware are decorated with floral and geometric motifs embossed and incised, in addition to design such as chevrons, arches, crosses, leaves, scrolls and creepers. The decorations were made on outer surfaces on the belly and shoulder portions in low relief, some of them are pressed against a mculd as the finer impressions on the inner surface show. The shape is mostly restricted to bowls.

Bhokardan (Deo and Gupte, 1974; pp. 88-89, 109, 212-213, F. 8) has yielded evidence of the imitation of the Megarian Ware with embossed decoration executed externally with the use of a mould. The shapes are cups and bowls embossed in relief with designs of bands, slanting lines and petals. At Banavasi (Narasimha Murthy, 1984; p.45), it has been found in between two pases of a building ascribable to the Satavahana period. No specific shapes are found. The imitation of the wares were mainly the result of the contact and exchange of commodities and seem to have inspired the local craftsmen to manufacture such wares simulating the original.

Moreover the restricted area or the core zone of their occurrence is also indeed to be emphasised. It could support the evidence that such goods served the need of a group of people possibly foreign traders staying in those places.

Amphorae

This is one of the characteristic shapes which was identified in many of the sites having Graeco-Roman influence in the first two centuries of the christian era. In other words, it is a familiar fossil type for identifying the sites participating in commercial traffic of the goods of foreign origin.

The main function of amphorae is to contain wine or oil. It consists of a long cylindrical body with a pointed base, a long narrow neck and two straight handles. The amphorae were pitched internally to preserve the wine or oil. The pointed varieties are usually found in Roman Period and used for storage in the cellars with the pointed base fixed in the ground, but when they are to be transported, then a tripod is used for putting them in position.

Sherds of amphorae of Mediterranean type was found at Arikamedu for the first time in stratigraphical contexts and it was continued to be imported throughout the occupation of the town. Many of them found here have been preserved with internal incrustation, which on analysis is found to contain resin, a common constituent of Mediterranean wines. Though full shapes are not found, but many of them are of pink fabric with yellow slip which are "in Europe commonly of a date before the middle of the first century A. D." (Wheeler, 1946 ; pp. 41-42). About 115 sherds were found representing almost equal number of vessels.

In the region of Karnataka-Maharashtra, the sites which have yielded amphorae are Bhokardan, Brahmapuri, Chandravalli, Junnar, Nevasa, Paunar and Ter. Among them Nevasa (Sankalia et al, 1960 ; pp. 280-81, 314-15, F. 146) has yielded a variety of shapes which include handle pieces, base, body and neck portions. Six varieties are found. All of them are creamy yellow in colour, heavy and show a mixture of very fine sand and clay. Two sherds have been found with resinous coating which, on examination is found to have been used as a coating for reducing the porosity of the pots. It also testifies "that the transit trade of Roman wine through the ports of the western coast *via* Junnar to Paithan is confirmed by these sherds." At Paunar (Deo and Dhavalikar, 1968; p. 48) they are of yellow colour with grooves on the exterior and the interior bearing ripple grooves and coated with black resin. Bhokardan (Deo and Gupte, 1974; pp. 101, 115) has also yielded portions of Amphorae with cream coloured surface and bearing corrugations in the interior. The fabric is heavy and the clay contains very fine sand.

Further evidence is also revealed by the finding of Amphorae in Gujarat coast and in the interior, such as at Akota, Devnimori, Dwarka, Nagara, Prabhas Patan and Shamalaji. Their availability in these areas testify to the progress of the trade and exchange of goods which are also supported by their viable situations on the trade routes, almost from Prabhas Patan on the West coast and Shamalaji situated on the outliers of Aravallis entering to South-eastern Rajasthan.

Some evidence of the contents are also known at Dwaraka and Devnimori.

All the fine sherds at Dwaraka (Ansari and Mate, 1966; pp. 72–73, F-19) show black incrustations on the inner surface. They are elongated with sharp base with a narrow cylindrical neck and two handles attached to rim and shoulder. They have stony compact core in uniform pink colour. Devnimori (Mehta and Chowdhary, 1966; p. 77) has yielded them with similar black incrustations sticking inside. Hegde who examined them, identified as resinous substance and probably the sedimentation of wine that was in the pot. The amphorae is made of well levigated clay and light cream in colour.

Equally amphorae is reported in large number along the South-east coast and also in the interior down south. Some of the notable sites include Dharanikota, Kanchipuram, Nagarjunakonda, Vasavasamudram, etc., quite a few represent imitations of amphorae locally made.

In the North-west Charsada (Wheeler, 1962; p. 97) and Taxila (Marshall, 1951; II. pp. 407-08, 415-16) have yielded the amphorae almost complete and original in shape and fabric. Marshall is of the view that the large two handled ones are of Graeco-Roman or Mesopotamian in origin and imported during the Saka-Parthian times.

The dispersal of amphorae at so many places in regions of Central and Western India, Deccan, South-east coast and the North-west point to the slow penetration of the products to the interior by trade and commerce. Initially the goods were brought inland from the Western and Eastern seaboards and then by transit travelled to the interior. This is revealed by the consistency of the evidence at these places.

Coins and coin bullae

An important evidence of the commercial contact is revealed by the finding of Roman coins in single or in hoards in a large number of sites predominantly from the Southern Peninsula as well as in Central India, Deccan and along the South-east coast. Considerable discussion has taken place, time and again with due emphasis on the economic, numismatic and cultural aspects (Sewell, 1904 ; pp. 609–15, Wheeler, 1946; App. I, Map, pp. 116-21, 1951; pp. 360-67, 1955; pp. 141-82).

In recent times, apart from those listed by Sewell and Wheeler, a few more sites have yielded Roman coins from surface and excavations. In addition to Brahmapuri and Chandravalli, other places have revealed them in considerable number. At Bangalore silver coins of the Roman Emperor Augustus and Tiberius numbering 250 were recovered while digging for runway for HAL Airport (IAR, 1964–65; p. 71). Very near to the airport at Yeshvantapur was also found Roman coins earlier (Narasimha Murthy, 1984; p. 45).

In the excavations at Vadgaon Madhavpur, District Belgaum has been found a silver Roman coin with the effigy of king's head on one side and the goddess on the other, contemporary to the Satavahana period (IAR, 1976–77; pp. 23-24; Sundara, 1981; pp. 87-97). An important hoard of Roman gold coins have been found in an earthen pot at the village Akki Alur, Hangal Taluq, District Dharwad. It contained 46 coins belonging to the Roman emperor Augustus (29 B.C. - 14 A.D.), Antonius Pius (138-61 A.D.), Thedosius II (408-450 A. D.), Marcian (450-57 A.D.), Leo I (457-474 A.D.), Zeno (474-491 A. D.), Anastisius (491-515 A. D.) and Justinus (517-527 A. D.). These finds are of great value since very few coins of later Roman rulers have been reported so far and it throws welcome light on the commercial continuity of the Indo-Roman contacts in the fifth and sixth centuries A.D. (IAR, 1976-77; p. 71). Not far away from this place is Banavasi from where has been reported Roman coin mould presently preserved in the local archaeological museum (Narasimha Murthy, 1984; pp. 45-46). It is made from fine grained agate, rectangular in form with actual coin details in circular shape. It represents only one half, while the other half is yet to be discovered. It depicts a lady seated in centre on a decorated chair and her legs rest on a footstool. She holds a sceptre in her right hand and a branch of tree in left. It bears a Greek legend on the edge. The mould contains a hook or a loop above the circular portion indicating it was meant to make a pendant and not to manufacture coins. It is also to be mentioned that some coins in the Akki Alur hoard were also found with such hook or loop. Possibly they were also prepared from similar moulds (Narasimha Murthy, 1984; p. 46). As to the identity of the coin, it is found to be quite similar to the reverse of the coin of Emperor Tiberius and others reported from Bangalore. So far no Roman coins have been reported from Banavasi.

Many sites on the South-east coast such as Dharanikota, Peddabankur, Kondapur, Nagarjunakonda, and Yeleswaram have yielded Roman coins from stratified levels. At Kudavalli (IAR, 1978-79; p. 39) has been reported two gold coins, one belonging to the Roman emperor Constantius II (337-361 A. D.) and the other one (half cut) of second Byzantine Emperor Anastasisus (491-518 A.D.). Though the two coins have two perforations on the upper edge for using them as pendants, the cancellation marks on the obverse of these coins indicate that they were in circulation duly authorised by the local rulers. Dhulikatta in District Karimnagar has yielded a Roman coin in base silver with head of Emperor Augustus on the obverse and Livea on the reverse from levels of the Satavahana period (IAR, 1976-77; pp. 4-5). A Roman gold coin of Emperor Faustina (113-161 A. D.) was also found from treasure trove in District Warangal (IAR, 1975-76; p. 72). Moreover about 47 silver coins consisting of 39 Roman *denari* and 8 Punch marked coins were found at a village, Nustulapur about 15 kms. from Karimnagar (Gupta, 1960; p 73). Of the 39 Roman coins, 13 are of Augustus and the remaining 26 belong to Tiberius. Peddabankur in the same district also yielded 5 Roman silver coins and four coins of imitation of lead plated with gold and have double perforations on top. Three of them are of Augustus and two of them of Emperor Tiberius. These coins are found in association with Satavahana coins (IAR, 1968-69; p. 2).

The significance of the recent finds in Andhra-Karnataka region of Roman coins should not go unnoticed. For the first time, a number of coins have been found belonging to the later Roman Emperors. Earlier finds in South India have not reported coins after Cara Calla (211-217 A. D.). The majority of the finds were *aureii* or *denarii* ranging from Emperor Augustus (29 B.C. - 14 A. D.) to Trojan (98-117 A. D.) and after the time of Nero (54-68 A. D.) these dwindle markedly. Hence these finds add more historical data which extends the Roman contacts upto the end of the fifth century A.D.

Another fact is that of the use of gold coins as pendants. Earlier a number of gold coins have been found in hoards defaced and multilated (i.e. incised or hole pierced on them for use as ornaments) and Wheeler reasoned out the cancellation of them as a coin issue (Wheeler, 1954; pp. 168-70). The defaced coins cover a wide range of time viz. from Claudius (41-45 A.D.) to Hadrian (117-138 A.D.). and one in Constantine's time (305 A.D). But what is more significant are those that were found with knob or loops at top. This is supported by the find of coin mould from Banavasi with a hook or loop above evidently made for use as pendants and not to make counterfeit coins. The very presence of a hook precludes the possibility of this as a coin making device.

The geographical distribution of the gold coins is quite interesting. They are mostly restricted to the ports and towns in Southern Peninsula comprising of the coastal Andhra Pradesh, Tamil Nadu, Karnataka and Kerala.

Many reasons are advanced for the non-occurrence of them in the North and Western India(Adhya,1966; pp. 125-26; Cunningham, pp. 22-23; Warmington, 1928; pp. 288-89, Wheeler, 1954; pp. 169-70). It is presumed that the Satavahanas minted the gold coins in order to keep the balance of trade and exchange. Moreover the Satavahana coins (Yazdani (ed.), 1960; p. 788) remained uninfluenced by the patterns and designs of the Roman coinage. It is also suggested that Kushana gold coins were minted of gold by means of exchange received from Roman trade. Others (Adhya, p. 181) maintain that it is due to the difference in the nature of foreign trade conducted by the two regions of South and North India; in the former the goods were brought from western world for local consumption; while in the latter it was mainly the transit trade that was passing through the Kushana realm. As the participants in the trade were of diverse nationalities there was not much possibility for the coins of any particular country flowing to the Kushana treasury as customs charges or otherwise (Adhya p. 185).

Much controversy persists in respect of the economic significance of the coin-hoards (Warmington, pp. 288-89; Schoff (tr) pp. 192-93, 219-20). One fact is to be emphasised viz., for the people, traders and businessmen of the times, the value of foreign money thus obtained from Roman traders was merely in the form of bullion; hence they were melted for making ornaments or were hoarded as gold silver objects (Wheeler, 1954; pp. 166-67).

Coin Bullae

To a large extent coin bullae have been found in sites with objects of Graeco-Roman character. These comprise of copies or imitations of Roman coins with similar coin symbols in metal and clay. They are made from moulds of terracotta or stone. Generally they were pierced at top or provided with loops suggesting their use for ornamental wearing.

Its geographical distribution in regions of Andhra Pradesh, Karnataka, Maharashtra during the period of the first century B.C. and the second century A.D. is quite interesting. The similarity of their nature suggests the provenance from a single source and their wide popularity indicate their specific use. At Brahmapuri (Sankalia and Dikshit, 1952; Pl. XXVI, B-6) it has the head of Emperor in low relief with the marginal legend on both sides of the figure. Similar bullae also come from Chandravalli (ARMAD, 1931; p. 29), Karad (Dikshit, 1949; p. 30, PL. XIII. c, d.) Paithan (IAR, 1965-66, p. 28), and Ter (1967-68; p. 35). Some of them at Chandravalli and Kondapur (Sreenivasachar, 1953; p. 8; Dikshit, 1952; PL. VI. 275, 276; Yazdani, 1941; pp. 179-86; PL. XIII. b) represent imitations of recognisable *sureii* or *denarii* of Roman emperors. A lead bullae or Roman coin has also been reported from Veerapuram, District Kurnool. It represents an imitation of gold aureus. It could have been used as an ornament with silver coating over it. It belongs to Hakusri and is an Indian imitation of Roman denarius (Sastri et al. 1981; p. 23; 1984; pp. 86-87). At Nevasa (Sankalia et al, 1960; 200–01, F. 83. 2-5) they were made in addition to terracotta, in gold and lead. The gold bullae bears the royal head bordered by dotted lines with two perforations on top. Similar is also in terracotta. Bhokardan (Deo and Gupte, pp. 74-77; PL. XXII. 1-6) has yielded six bullae. Some have devices on both sides, while others have the bust with a flat back. All have pierced holes for suspension. They bear imitations of *aureii* or *denarii* of Roman Emperor Tiberius. Kausan near Paithan (IAR, 1965-66; p. 28) has also yielded terracotta bullae in imitation of Roman coins along with Kaolin figurines from Satavahana period (c. 200 B.C.-100 A.D.), Ujjain (IAR, 1956-57; p. 23; Fig. 11; 1957–58; p. 36) has yielded a bullae with an effigy of Emperor Augustus Hadrianus. At Nagarjunakonda (IAR, 1956–57; p. 38, PL. LXI; DG's Reg. No. 375/73) a number of imitations of Roman coins have been found in clay medallions. Dikshit (AARADGS, 1938-39; PL. XVIII (d)) mentions one from Kholapur, Dist. Akola with a loop of applique work for stringing and depicting the head in imitation of a Roman coin. Sisupalgarh (Lal, AI. 5, 1949; p. 101) has yielded them with a flat back and loops for suspension. Some interesting clay-bullae were also found at Uparkot–Junagadh (Margabandhu, 1975; pp. 175-81). One is a small clay bullae bearing a Yaksha figure and a Kshatrapa ruler on the reverse. It is for the first time in a bullae, any other figure apart from coin symbol is found represented.

It is evident that the coin bullae have been found from the last quarter of the first century B.C., but were more common in levels of the first and the second century A D. Predominantly, it has been found in many sites ascribable to the Satavahana period, in Karnataka-Maharashtra and in Andhra Pradesh, it continues to occur in Ikshvaku times in sites of South-east coast.

The functional purpose of the coin bullae is still a matter of discussion. Its use as a pendant has been revealed by the loop on top for ornamental wearing (Karl Khandalawala, 1960; p. 55). It is not clear as to why Roman coins were alone imitated, while no indigenous coins were used for a similar purpose. Its manufacture in terracotta on a mass scale also support its popular use.

Lamps

Among other objects which are identified as of Roman origin, one of which is the finding at Arikamedu of lamps prepared in terracotta (Wheeler, 1946; p. 1010). It is assigned to the Augustan Period. Ter is another site which has yielded them in large number and also in varieties and have been identified as local imitations of Roman lamps (Deshpande, 1965; pp. 606-07; Margabandhu, 1978; pp. 91–97). They consist of small bowls with straight nozzles. They are both plain and decorated. They have small circular holes for oil and circular pipe shaped horizontal nozzle tapering to a small wick-end. Unlike the Greek and Roman examples which have space for wicks to project out, in the Indian lamps the feature is missing. The lamps have handles in contrast to their western proto-types. Most of the handles are decorated with human head and beck of birds as well as other geometric designs. They bear vertical perforation in handles for fixing on walls. Their body portions bear designs such as ribs, rays and thick stemmed designs perhaps made in mould. At best the type and shape is typically Graeco-Roman whereas the decorative features are essentially Indian.

Bronze objects

Some typical bronze objects have also been reported at Brahmapuri and Nevasa which have been identified as of Graeco-Roman origin. In addition Akola and Shamalaji have also yielded bronze statuettes of similar extraction. At Brahmapuri (Karl Khandalawala, 1960; pp. 56-62) the objects were identified from among a 'hoard' which consisted of a large variety of vessels, figures and other utensils of daily use. Those of Graeco-Roman or Alexandrian extraction include a statuette of Poseidon, two handles of wine jugs of identical design, possibly cast from the same mould depicted with satyr's head, dolphin and cupid riding on lion in a curved shape. Another one is a thin circular metal *repousse* emblema depicting Perseus-Andromeda legend perhaps forming part of a dish, decorative portion of a small mirror case and a wine jug with a trefoil rim and a lion face handle. The disc on which the lion's paw rests has traces of silver inlay in the pattern of tendrils surrounding the paw. Originally it was soldered to the jug. Other articles include little cups with grooved rings at centre, grooved candle stick-base and a mirror with *omphalos* at centre.

Nevasa (Sankalia et al., 1960; pp. 421-22; f. 187.5) has yielded a dish with boss at centre complete with straight sides and concave base and is similar to specimens at Sirkap (Marshall, 1951; II. pp. 418, 592; PL. 175. 289) which are traced to Hellenistic or Graeco-Roman proto-types.

Mirrors with omphalos at centre with a dish shape seem to be a characteristic feature found in Roman metal work, and it is quite likely that it was derived from earlier articles of Graeco-Roman workmanship. The nearest workshop for the metal products is traced to Alexandria, where similar artefacts were made and exported. Similar bronze hand mirrors have also been reported at Adichanallur, Basarh and Rairh. But they seem to be of local manufacture, since they occur earlier to those from Brahmapuri (Margabandhu, 1977; pp. 432-36).

Further in Western India, Baroda (Desai, 1949-50; pp. 21-23; Wheeler, 1954; p. 181) has yielded some objects of imported workmanship such as fragment of Roman bronze handle and several pieces of trefoil mouth of a jug. The handles represent a young boy identified as cupid sitting on a bench holding a rod emerging from the hole in the bench. Another is a unique bronze statuette of Atlas from Shamalaji (Chowdhary, 1961-62; pp. 309-15). It is difficult to trace its source, but is a "representative type of the blending of artistic traditions of Graeco-Roman and Indian and possibly made in India during the third and the fourth century A.D."

Evidently these objects mostly contain features which are obviously direct imports. Rarely were they made locally adopting the features in realistic modelling such as the one from Shamalaji.

Cameos

These consist of carvings made in relief over a gem with differently coloured lower layer which served as a contrastive background. The best material used are various forms of chalcedonic materials such as chalcedony, agate, onyx, etc. Cameo cutting is believed to have originated in the Middle East and it flourished in the first half of the first century A.D., particularly in the work of Dioscourides. Among the outstanding surviving cameos from the period are portraits of Roman Emperors and representations of mythological themes.

In the Indian context Karvan (Mehta, 1952-53; pp. 133-35) and Ter (Deshpande, 1965; p. 604) are the two sites which have yielded them; both of them have been traced to Hellenistic or Roman sources.

Caltrops

This weapon is used in warfare and spread on the road to obstruct the progress of horses and elephants (Lal, 1949; pp. 91-93) and "occur on the Roman military sites of the early centuries A.D. in Western Europe."

Nasik, Saradkel and Sisupalgarh have reported them. At Nasik (Sankalia and Deo, 1955; p. 112, PL. XXVI B) they have perfect, tapering and sharp pointed spikes, one with three and the other with four spikes datable to c. 300–200 B.C. Specimens at Sisupalgarh (200 B.C.–300 A.D.) have four radiating spikes. Saradkel (IAR, 1964-65, p. 6) has also yielded them along with other iron objects from an iron smithy which possibly indicates that caltrops were locally made (Banerjee, 1965; pp. 221-235).

Literary evidence also alludes to such objects (Dikshit, 1964 65; pp. 182-83) especially Kautilya in 'Arthasastra' and Kamandaka in 'Nitisara.'

The rare occurrence of caltrops indicate its external origin.

These are the characteristic finds which are of Hellenistic or Graeco-Roman in origin in a direct sense. It is not also unlikely that apart from the typical of them which are manifestly brought by the western traders for commercial purposes, there are many of them which have been manufactured locally with the superior technique, reproducing in identical shapes and design. This is more likely to be true in respect of Rouletted Ware with stamped and moulded designs, lamps, bronze figurines, etc. Arising out of the direct contact many more new ceramics and other techniques were evolved and gradually adopted and assimilated with different regional variations which occur in one form or the other in most of the Early Historic sites of Karnataka-Maharashtra. The new ceramics include Red Polished Ware, Kaolin Ware, and wares with various stamped designs, mould-made vessels and terracotta figurines (Deshpande, 1963; pp. 603-10, 1968; pp. 278-79).

A great motivating factor in the commercial enterprise is the long uninterrupted natural coastline of the western sea board which facilitated easy anchorage and also the various natural routes which connected the cities and towns in the interior (Deshpande, 1959; pp.67-79). In other words this ancient caravan route (*Sarthavahapatha*) ran along regions of the modern portions of Karnataka-Maharashtra and provided easy access to the towns and emporia of the South-east coast. The viable significance of the cultural link during the early Historical period is still yet to be studied in proper perspective.

Another important aspect is to be assessed in respect of the various reasons that motivated the commercial intercourse. Why were the traders from outside frequented the area and what are the products manufactured that were offered for sale export. It is quite fascinating to explore this aspect as to the industries that flourished in various Early Historic towns in Karnataka-Maharashtra which attracted foreigners to these places.

Excavations of many Early Historic towns have revealed quite interesting evidence of the various types of industries that manufactured finished goods made from a variety of raw materials. Among them include various products of industrial and fine arts catering to the sophisticated urban elite, ornaments different of shapes and varieties and other creative objects of aesthetic value. Some of the towns and cities that have unveiled them include Bahal, Bhokardan, Brahmapuri, Broach, Chandravalli, Kondapur, Maheshwar, Maski, Nasik, Nevasa, Paithan, Paunar, Ter, Vadgaon-Madhavpur, Ujjain, etc. These were important manufacturing centres that developed into towns during the early centuries of the Christian era. Many of them were situated on the caravan routes and quite a few of them also became flourishing cities during the Satavahana Period (Margabandhu, 1985; pp. 4-5, 10-11, 196-7). Some of them were foremost lapidary centres producing objects in semi-precious stones glass, shell, bone and ivory and terracotta. For instance bead industries flourished at Bhokardan, Brahmapuri, Broach, Cambay (Nagara), Kondapur, Maski, Nevasa, Paithan and Ujjain. Centres of shell industry include Amreli, Bhokardan, Maheshwar, Maski, Nagara, Nasik, Nevasa, Paunar, Prakash and Ujjain. Glass industry thrived at Brahmapuri, Bhokardan, Maski, Nevasa, Prakash and Ter. Artistic objects in bone and ivory were made at Bhokardan, Brahmapuri, Kondapur, Nevasa and Ter.

It is for these material objects that the traders thronged to the various centres for purchase and also exchange in return of their foreign wares, both in terms of money and goods. This mutual commercial enterprise developed into interchange of a number of cultural objects, when the foreigners came to stay for some time at many places, all along the region. The resultant outcome is the find of material objects at various places of their stay over long periods in several marts and towns in the interior. Much evidence is still to be properly assessed to understand the full extent of the cultural impact that culminated in this commercial venture.

35. SOME PROBLEMS IN MEDIEVAL ARCHAEOLOGY

M. S. Mate

A beautiful book in two volumes entitled 'Ancient Remains, Monuments and Museums' was brought out by the Archaeological Survey of India to celebrate its Centenary. (Ghosh, 1964). It has taken a brief but complete review of the work that the Survey had done during this period of hundred years. Reference to work by other agencies has also been made wherever necessary. Almost simultaneously but independently two books reveiwed the progress of archaeology in India, (Lal, 1964, Sankalia 1979). Recently Amarnath Khanna has brought out a book on the same lines (Khanna, 1964). I may not be overstating the case when I say that a perusal of this literature leads one to conclude that almost all archaeological work in India during this period and pertaining to the medieval period confines itself to two aspects only. One was the careful survey and recording of standing monuments. The other was conservation of these monuments. Study of architectural monuments undoubtedly forms part of archaeology but they are not by themselves archaeology. Archaeology is some thing much broader. Discovering, uncovering and interpreting the material remains and environs of ancient and medieval societies would form part of any archaeological effort.

A brief glance at the various phases in the archaeological work in India might be illuminating. In the first phase we have giants in the field of epigraphy and numismatics as well as historians of architecture. The second phase which chronologically is not far removed from the first, witnessed scholars anxious to undertake field surveys and excavations, but they depended heavily on Buddhist and Hindu religious works, epics and epigraphs. As is well known Cunningham retraced the steps of Huien Tsang. Even today explorations and excavations pertaining to the Ramayana and Mahabharata are very much in progress, although firm and concrete results seem to be eluding us. The third phase belonged to the Harappans, they continue to exercise the minds of our, archaeologists even today. The fourth phase belongs to the stone age man in a very real sense of the term. For a time almost everybody seemed to be occupied in probing this or that river valley in search of the artefacts of stone age man, fossils and what not. All the phases in the life of prehistoric man, from palaeolithic to megalithic are being intensively investigated into. Archaeological effort in the sense of discovery and interpretation of the remains of past societies carefully avoided any place that went beyond 1200 A.D. or so. It was as if the evolution of Indian society came to an abrupt end by this date. This mental and psychological barrier still prevails as can be witnessed from the proceedings of the Seminar on Recent Advances in Indian Archaeology organised by the Deccan College where all the work done in recent years at places like Champaner, Hampi etc. was totally ignored. True, special lectures were arranged on Hampi and Daulatabad, but I believe they were arranged more as a gesture to certain individuals rather than any academic conviction. This mental barrier is perhaps the foremost problem facing medieval archaeology in India.

It cannot be forgotten that significant work has been done on at least four sites of the medieval period in recent years. Fatehpur Sikri in the north, Champaner in western India, Daulatabad in the Deccan and Hampi in South Deccan have been subjected to intensive studies. Out of these Hampi work has been reported in some detail, Champaner slightly more extensively, Fatehpur Sikri and Daulatabad only in bits. A preliminary report on Daulatabad is almost ready for the press and its publication would serve at least one purpose, to isolate and emphasise the areas of ignorance in the field of medieval archaeology. That apart, it would be realised that compared to the very large number of early historic and protohistoric sites the number of medieval sites touched is pitifully small.

The reasons for this are indeed numerous. The most important has already been mentioned.

Next is the existence of contemporary written records, both literary as well as official. The availability of these records has led to the belief that everything worth knowing about medieval life was already known, and hence the archaeologist has nothing to contribute. The work at Fatehpur Sikri, Hampi, Champaner and now at Daulatabad has proved that this fondly held belief is erroneous. The archaeologist has a vital role to play in the understanding of the material culture and through it the society of the medieval period. This literature is often detailed and the archaeologist cannot afford to ignore it. Many times the authors were so close to the Court or the events they describe that their authenticity cannot be easily questioned. They therefore serve as excellent guides to any student.However there are few people who have direct access to original literary sources.The latter are mostly in Persian sometimes in Arabic and persons having good knowledge of these languages take to the study of either literature or religion. On our side we must confess that we do little to encourage them to take more interest in archaeological work : it is little realised that the loss is ours.

Apart from the equipment necessary for dealing medieval sites, there are problems of methodology that the nature of the sites pose. Most of the medieval sites are extensive and are encircled by ramparts. Almost all of them are under occupation, remains of older habitations lie hidden beneath modern houses, roads, gardens. Then the medieval townships, especially Islamic, tend to spread over extensive areas. Important structures like palaces, mosques and tombs had around them wide open areas in which gardens were often laid. This resulted in the isolation of buildings from one another. The dwellings of ordinary people tended to cluster around such monumental structures resulting in isolated clusters of habitations. This tendency of medieval townships to grow horizontally and in small detached patches poses a real problem, more especially to the Indian archaeologist who is traditionally trained to tackle thick occupational deposits and carry out vertical excavations. Medieval sites would not lend themselves to this approach. Any attempt to seek vertical stratification is bound to be defeated. It is almost impossible to evolve a stratified sequence that would be valid for the whole area or even to a major part of it. Therefore what attains maximum significance is surface survey. It would be undoubtedly facilitated by contour maps, but the investigator would have to be familiar with the behaviour of the medieval habitations. Leg-work, observation of the most exacting nature, would be necessary. Selective excavations could follow but the emphasis would have to be on surface surveys and interpretation of the various obvious features. Aerial photography would be a great help, it would become almost indispensable.

A few other points may also be mentioned. Structural remains intervene at every step and for any person attempting to deal with such a site it would be necessary to familiarise himself with various structural practices, howsoever minor they may appear to be. It becomes almost as important as knowledge of pottery in a protohistoric or early historic site. But for polychrome glass bangles and Chinese Celadon ware, no antiquities or pottery types have yet been identified as typyfying say the Rashtrakuta, the Chalukya or the Yadava period. All this information has to be collected. It would serve to guide future investigations.

Knowledge of the material culture and the technological practices of countries of West Asia with which India had come in close contact during the medieval period is perhaps a very vital qualification for any investigation in the field.

These are some of the major problems that I could identify after a few years of work at Daulatabad and I have placed these before the gathered scholars in the hope that additional ones would be coming up for discussion, and of course possible solutions discussed.

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36. GRAVES OF THE EARLY IRON-USING PEOPLE AT KOMARANAHALLI —RECENT EVIDENCE

M. S. Nagaraja Rao

Excavations at Hallur, Hirekerur Taluk, Dharwar District, Karnataka, during 1965 revealed that introduction of iron into peninsular India, took place around 1000 B.C.[1] The overlap phase at Hallur indicated the arrival at Hallur, of a new wave of people, with iron implements, consisting of arrowheads, spear heads, daggers and knife blades. They also brought with them a new and distinctive pottery known as the black-and-red ware, with a white painted variety. The white paintings consisted of groups of strokes effected after the pots were fired. The earlier neolithic inhabitants buried their dead in the habitation itself, many times, under the floor of their own huts. But during the overlap phase, with the arrival of the iron-using people, the disposal of the dead appears to have been carried out away from the habitation.

The excavations of megalithic graves consisting of stone circles at Tadakanahalli, about 8 Kms. west of Hallur, during 1978, revealed that all the 4 excavated graves could be associated with the overlap phase at Hallur. For, the graves yielded not only iron implements, similar to what were found in the overlap phase at Hallur, but also contained white-painted black-and-red ware bowls, similar to those from the overlap phase. The graves also contained urn burials inside the stone circles, thus clearly indicating overlap of neolithic and megalithic elements.[2] The evidence helped to date the megalithic stone circles, on the basis of the chronology, arrived at for the overlap phase at Hallur. With this background, it was decided to look for more megalithic sites, in the region, in order to establish a chronological pattern for early megaliths.

Information about the existence of stone circles in the village of Komaranahalli, in Harihar Taluk, Chitradurga District, 13 Kms due east of Hallur, was available. However the site was considered interesting, as the graves were supposed to contain sarcophagi. If true, it would have been for the first time that sarcophagi was found so far north-west in the south. Therefore, it was decided to excavate the graves at this site.

The graves are also located to the south to south-west of the village and surrounded by gneissic outcrops rising about 150 Mtrs. above the plains on one side and a large water tank on the other side. Burials are located on the slopy ground along the foot of the hill.

The Megaliths :

Megaliths at this site can be classified into two types(1)Pit Burials with cairn heap and (2) Pit Burials with capstone. Both have stone circles above ground.

Pit Burial with Cairn Circle :

The excavations revealed that rectangula pit is cut into the natural soil and into natural laterite rock. Grave goods are arranged at the base of the pit which is filled with soil. On the edge of the pit prop stones are kept to support cap stone. The pit is covered on the surface with one or two big natural flat stones which are rolled down from the top of the elevated hill. Pit area is enclosed with a stone circle, within which a cairn heap is formed.

Megalith I (Fig. I. Pls. I-IV) :

It is a pit burial with cap stone. Grave goods consisting of pots, iron implements and stone tools were placed over flat natural rock surface. These were covered by silt found in the form of thin layers upto 0.35 m. The formation of silt indicates that the grave goods were kept without covering for considerable time. Then the pit was filled with greyish soil upto the surface. Small stones were placed on the edge of the pit over which were kept two large undressed capstones in north-south direction.

Pottery consisted of Red ware globular vessels with three spouts; pots with conical base; handmade lipped bowl; conical lids of black ware, stands and bowls; and black and red ware bowls, with white paintings. Iron implements consisted of arrow-heads, knives, axe, and probably a goad. Stone tools consist of two rubber stones. No skeletal remains were found in this burial. Perhaps whatever was interred has disintegrated.

Megalith II (Fig. II, Pls.V–VII) :

It is a pit burial with cairn and stone circle. Pots and iron implements were kept on the pit floor. Skeletal remains with iron implements were placed over the pots. The pit was filled with greyish soil mixed with laterite. A stone circle was formed around the pit. Inner diameter of the circle was 7.60 m and outer diameter was 12.30 m. A heap of a small stones formed the cairn within the circle.

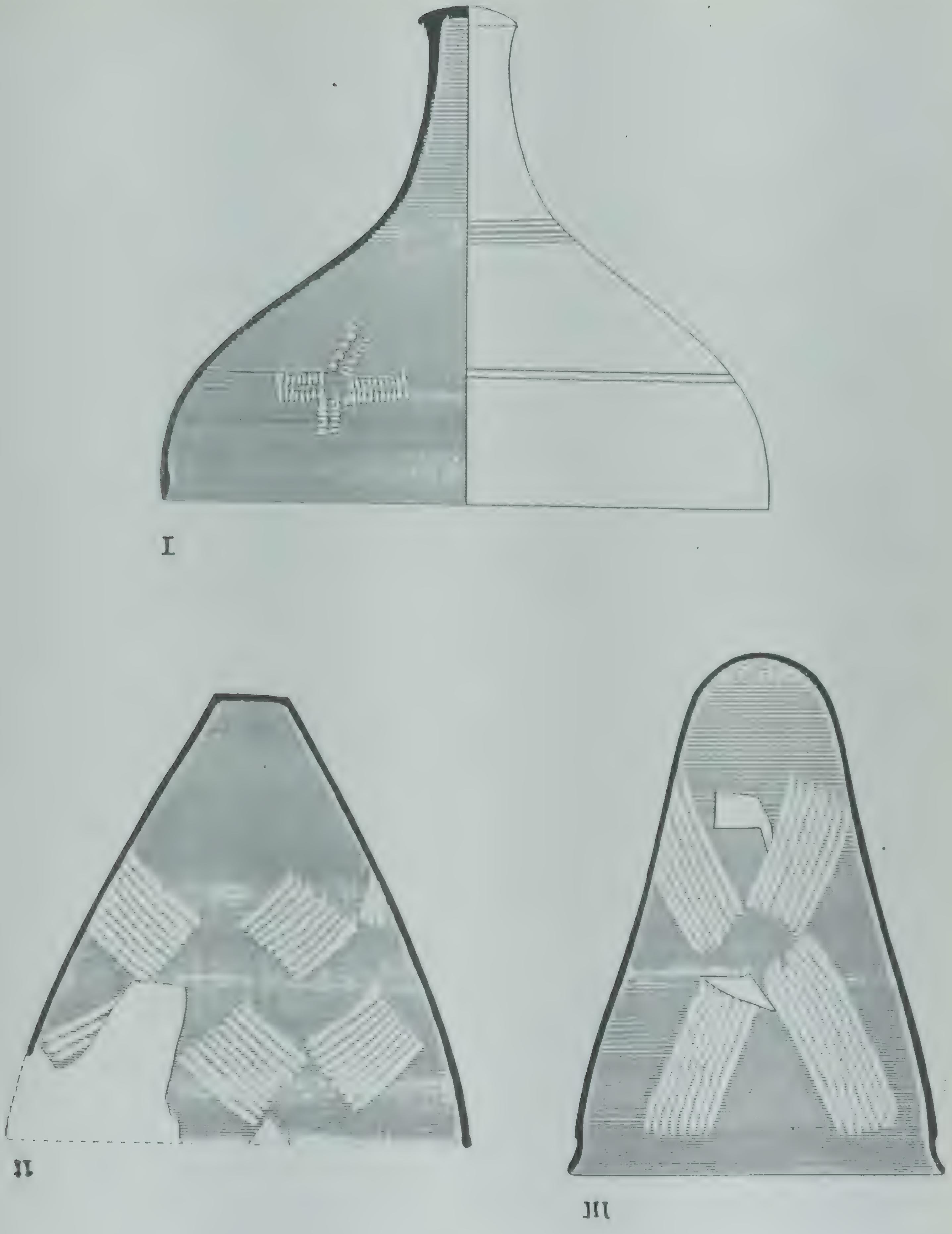
Pottery consisted of red ware, globular and elongated pots; Black ware bowls and conical lids; Black-and-Red ware pots, bowls and deep conical bowls. Some of the Red ware pots were found to be hand made. Two Black-ware conical lids were white painted. The painted designs were groups of criss-cross strokes. Iron implements consisted of arrow-heads, an axe, a spear-head, a large sword and a long spear measuring 1.77m. Skeletal remains consisted of human skeletal remains including three skulls, long bones, ribs etc., and a few heavy bones of animal. A circular grinding stone and a terracotta bead were found. Another grinding stone was also found among the stones which formed the stone circle.

Megalith III (Pls. VIII-IX) :

It is a pit burial with capstones. A rectangular pit measuring 2.20 x 2 m and larger axis in east-west orientation was cut first into the natural soil to a depth of 0.60 m. and then into the natural laterite rock to a depth of 1.40 m., the total depth being 2.00 m. The bottom of the pit measures 1.05 x 1.80 m. Pots and an iron implements were arranged on the rock surface and fine red soil was spread to cover the pots. Above this were kept skeletal remains. The pit was filled up to the ground level with a soft red soil. Small stones were kept on the sides of the pit over which were placed two large undressed capstones measuring 3.10 x 1.20 m. and 3.00 x 1.35 m. in north-south orientation.

Pottery from this grave consisted of Red ware stands, a small pot, Black ware bowls, conical lids, Black-and-Red ware bowl and a pot. An arrow-head is the only iron implement found in this burial. Skeletal remains consisted of two skulls, long bones, ribs etc.

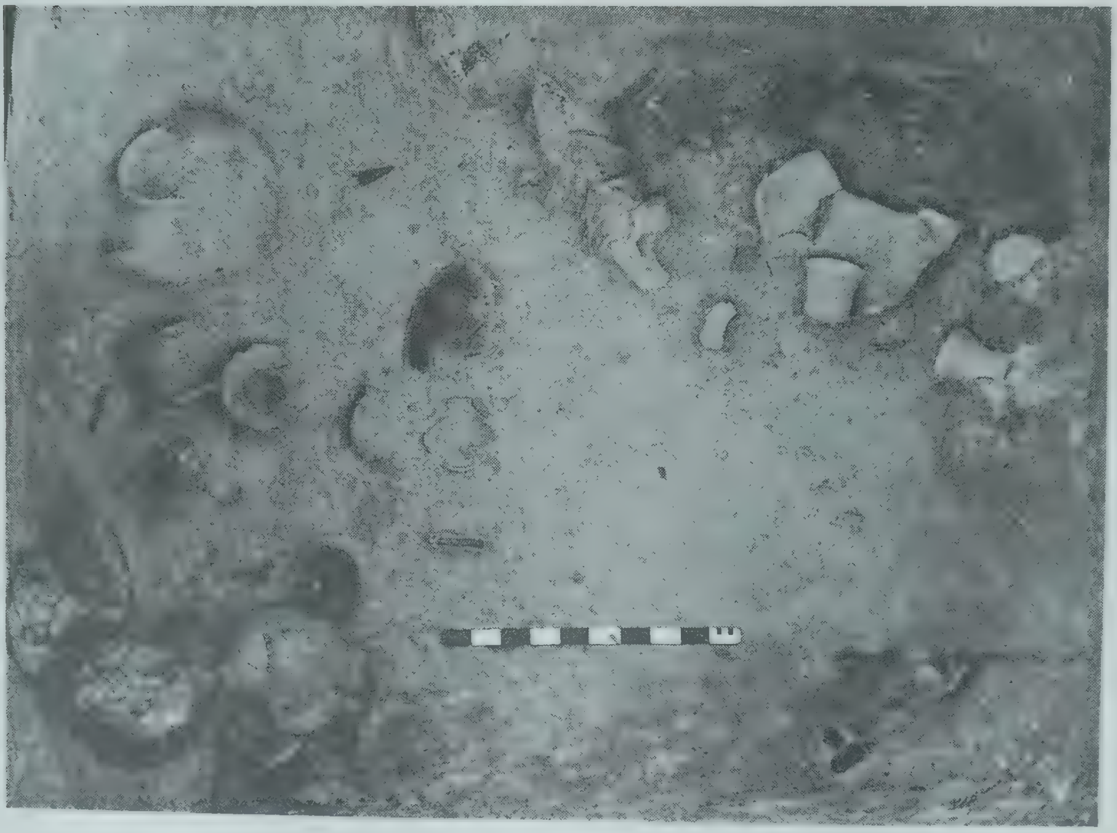
Four stones kept in the corners might have been used perhaps for keeping a plank over which skeletal remains might have been placed.



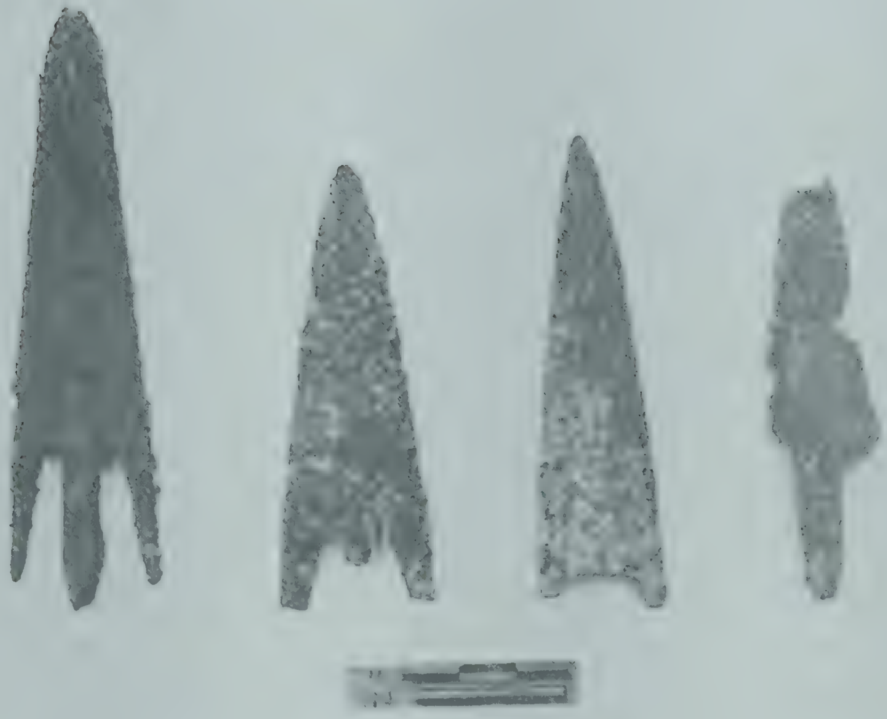
Figs.I-III, Komaranahalli: Conical Lids

KOMARANAHALLI (Chitradurga Dist., Karnataka)
Megalithic Excavations - Grave-1.

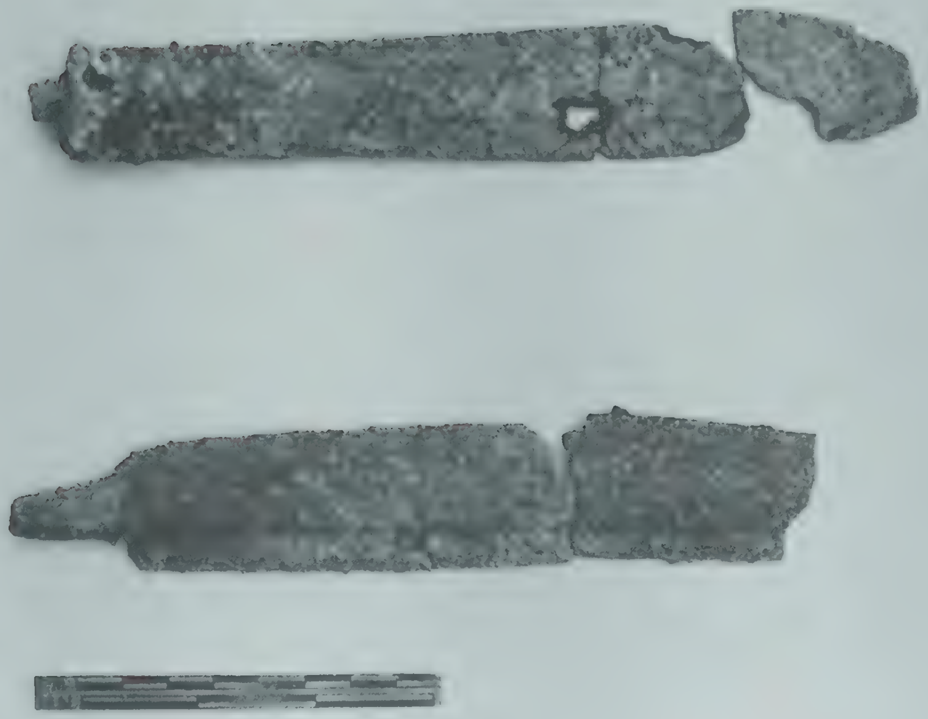
Pl. I. Capstones-After clearing the vegetation



Pl. II. Pottery and Iron Implements

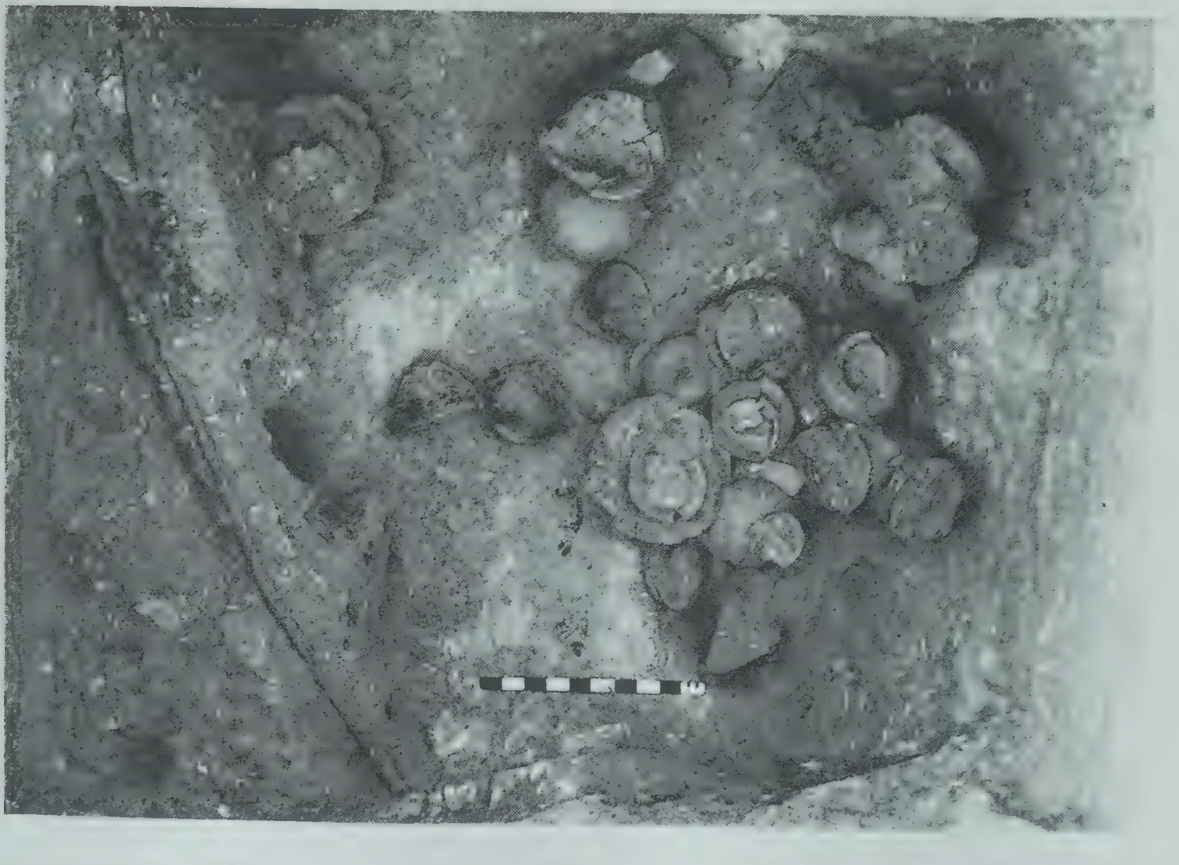


Pl. III. Arrowheads



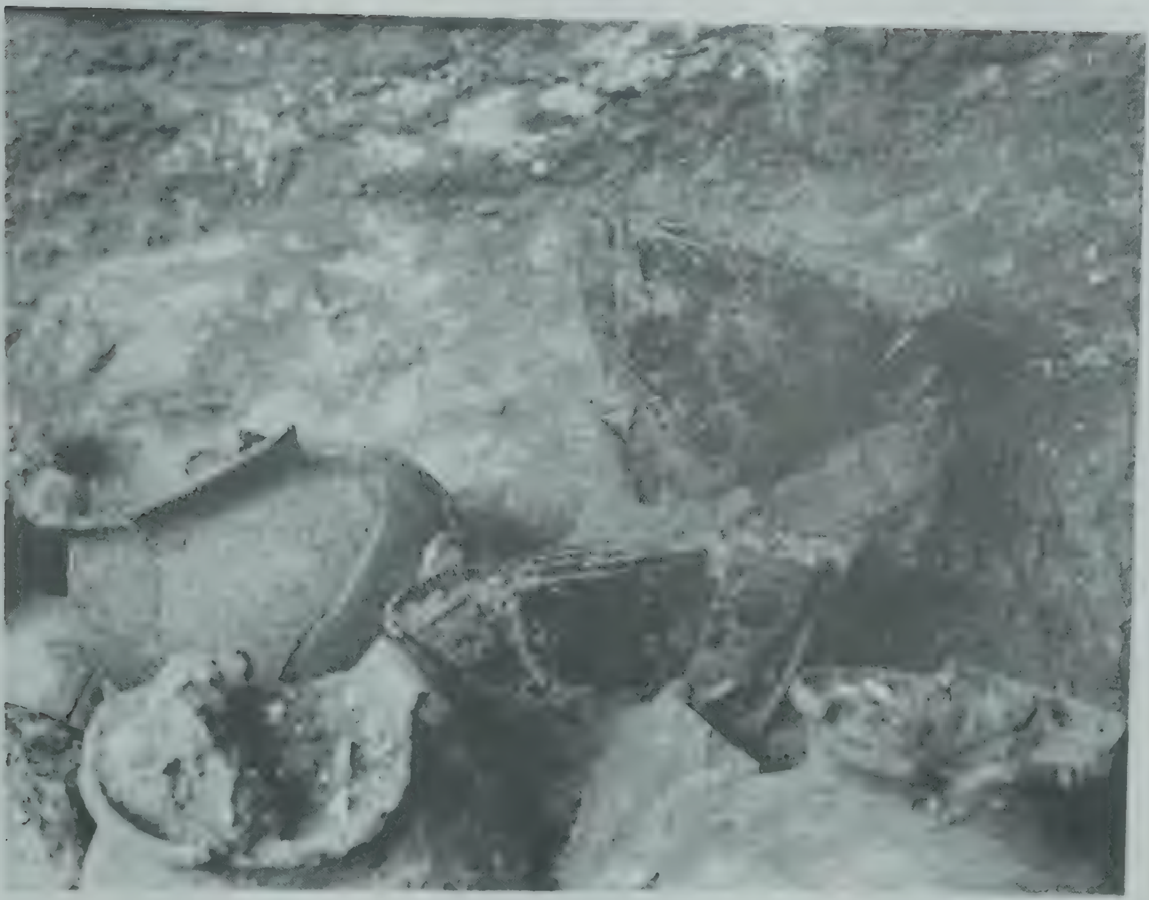
Pl. IV. Dagger or Knife

Pl. V. Stone Circle



Pl. VI. Pottery and Iron Implements

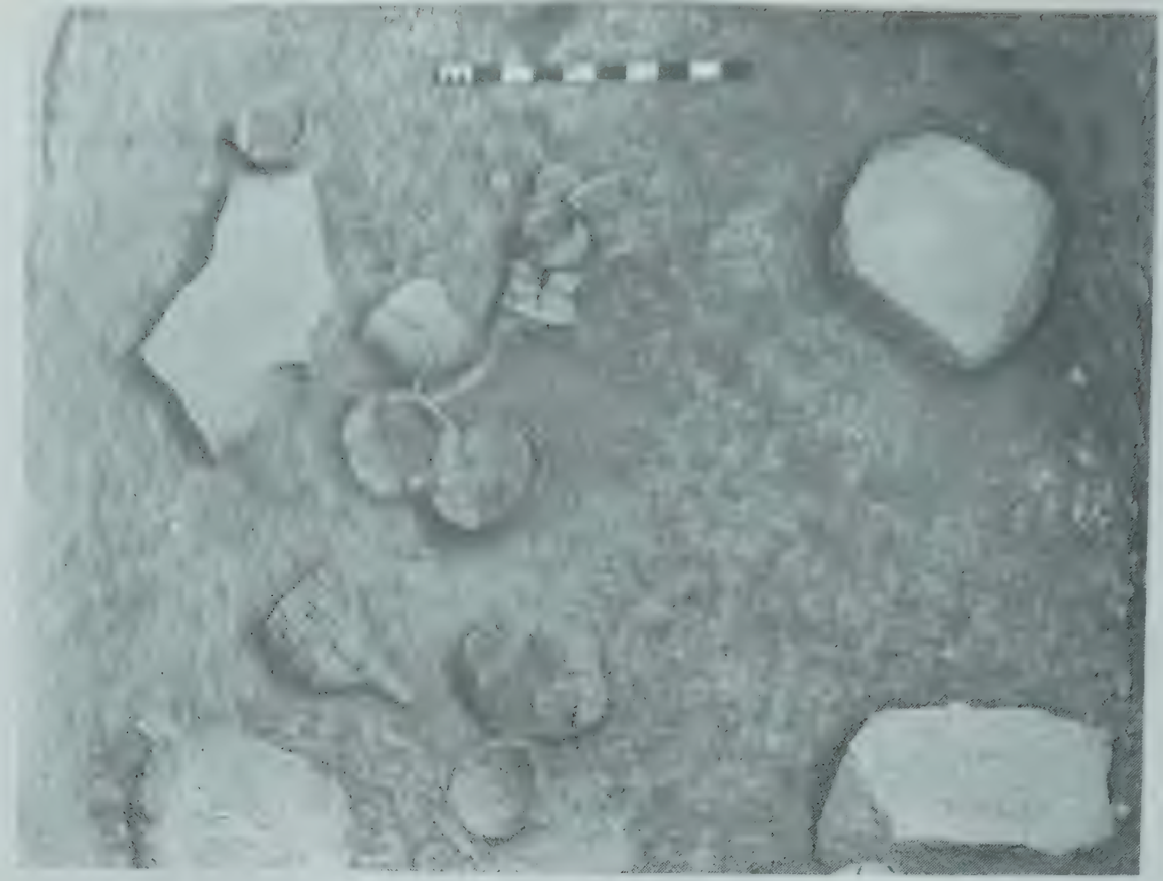
KOMARANAHALLI, Grave - 2



KOMARANAHALLI, Grave - 3

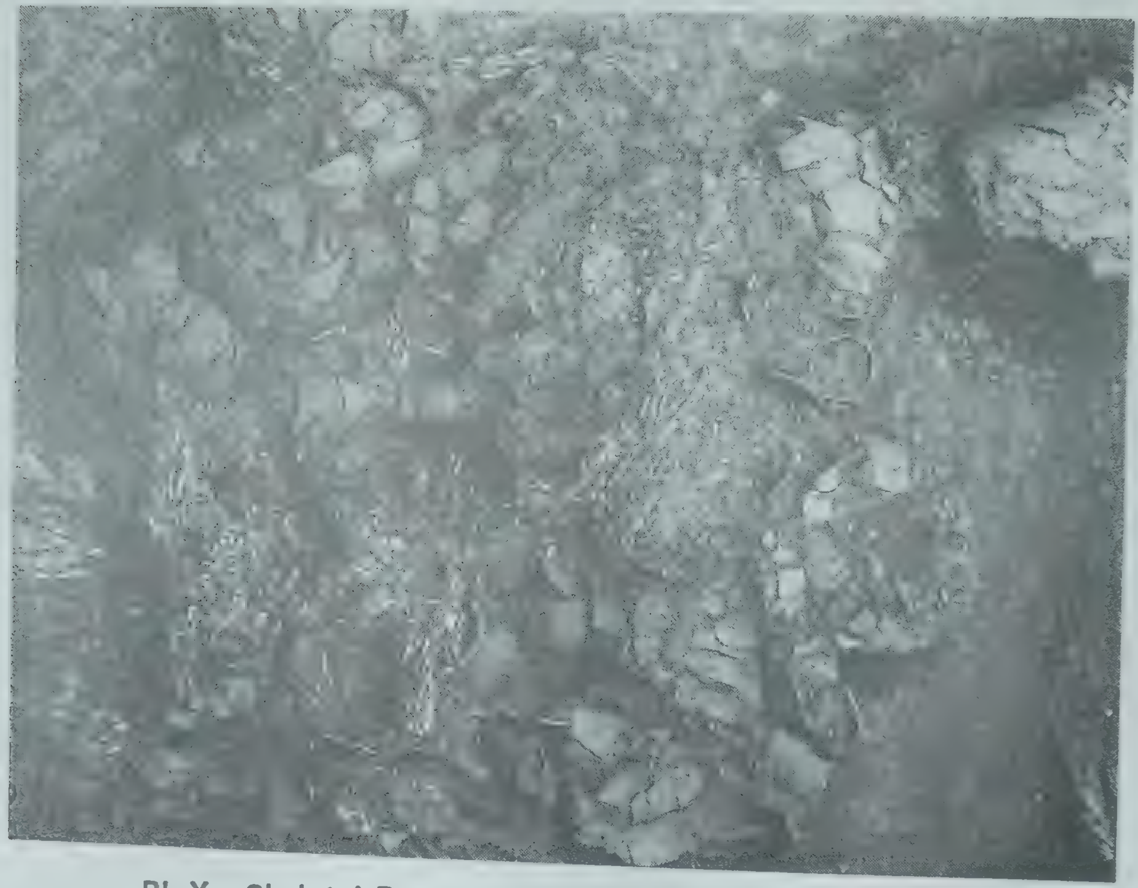
Pl. VIII. Capstones

KOMARANAHALLI - 3



Pl. IX. Pottery and Corner Stones

KOMARANAHALLI, Grave – 4



Pl. X. Skeletal Remains, Pottery and Iron Implements

Megalith IV (Fig. III,Pl. X) :

In this grave, pots and iron implements were arranged at the base of the pot. Soil was spread over the pots to form a kind of platform to keep skeletal remains. After arranging skeletal remains, the pit was filled with blackish clay brought from nearby tank upto ground level. Rectangular dressed stones were kept along the eastern and western sides of the pit stretching into it. The stone circle and the cairn were totally disturbed by cultivation.

Pottery from this grave, consisted of Red Ware pots some of which were hand made, bowls of Black Ware and conical lids; and Black-and-Red ware bowls. Skeletal remains were crushed to pieces by the overlying clay. Iron implements consisted of spear heads and an arrow-head. Stone objects consisted of two small grinding stones.

The four graves excavated at Komaranahalli,reveal two varieties.The cairn heap with stone circle, graves 2 and 4 are similar to what we know from Tadakanahalli.[3] Therefore, we may not be wrong in ascribing them to the overlap phase of Hallur. This is confirmed by the occurrence of white painted black-and-red ware vessels, similar to what we know from Hallur overlap phase.

Graves 1 and 3, however, appear to be slightly later than 2 and 4. For they indicate a new tradition of covering the pit with unhewn capstones. Grave 1 yielded white painted black-and-red ware and a globular vessel with three spouts. Therefore, graves 1 and 3 appear to be slightly later than 2 and 4. We may thus discern a developmental stage in the megalithic tradition.

It may incidentally be noted that no sarcophagus was found in any of the graves·

With regard to absolute chronology, the Physical Research Laboratory, Ahmedabad obtained pottery samples from Megaliths II, III & IV and have provided the following thermoluminescene dates :

PRL-TL-50	Megalithic Black and Red Ware MEG II	3420 (± - -, ± 290) (α_o) B.C. 1440 3080 (± --; ± 260) ($\alpha_{\perp}$) B.C. 1100 (more apropriate)
PRL-TL-49	Megalithic Black Ware MEG. III	3110- (± · · ; ± 500) (α_o) B.C 1130 2910 (± --; ± 470) ($\alpha_{\perp}$) B.C. 930 (more appropriate)
PRL-TL-47	Megalithic and red coloured Ware MEG. IV	3360 (± --. ± 300) (α_Q) B.C. 1380 3180 (± --, ± 280) ($\alpha_{\perp}$) B C 1200 (more appropriate)
PRL-TL-46	Megalithic Black coloured Ware MEG. IV	3300 (± --; ± 400) B C. 1320

With the MASCA calibrated dates for the Hallur site, these dates appear more appropriate and acceptable. Therefore, not only the association of these graves with the overlap phase of Hallur is more plausible, but also pushes back the dates of these early group of megaliths to about the last quarter 2nd Millennium B.C. onwards.

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